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PIT AND QUARRY

JULY, 1946

Eighteenth Annual
Cement Mills
Number

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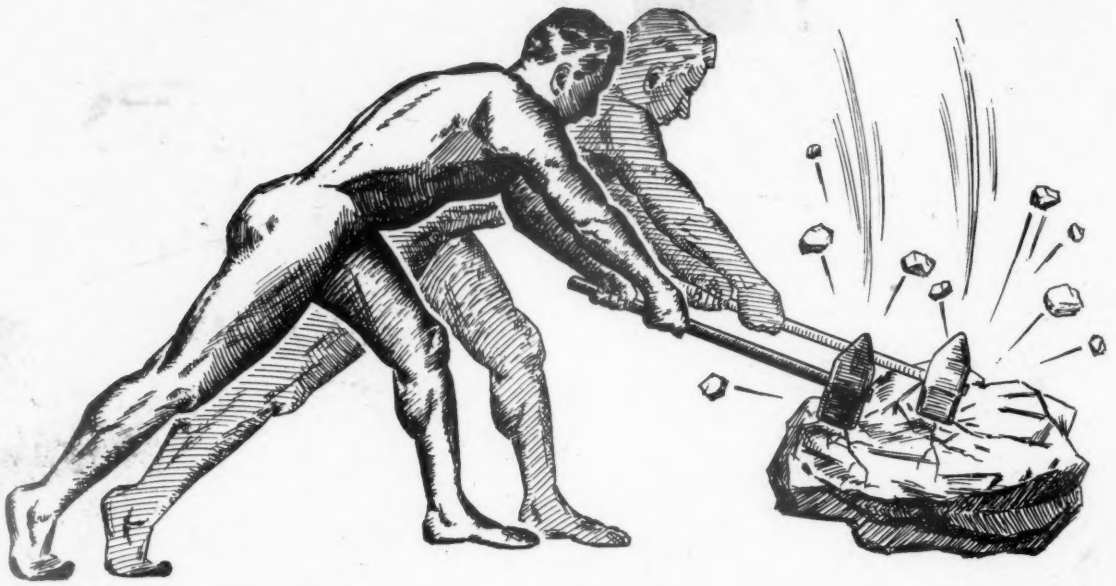

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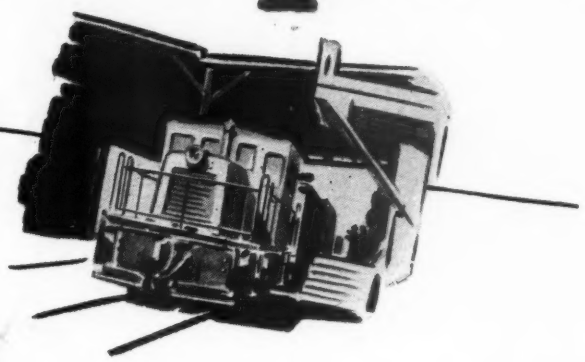

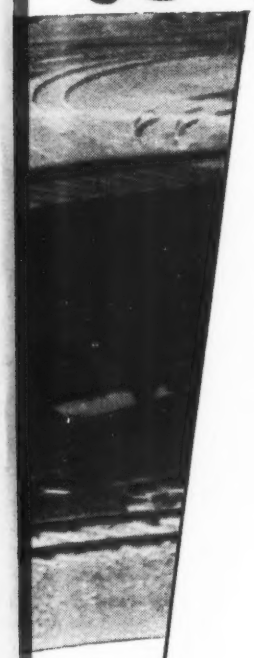

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PIT AND QUARRY

July, 1946
Vol. 39 No. 1

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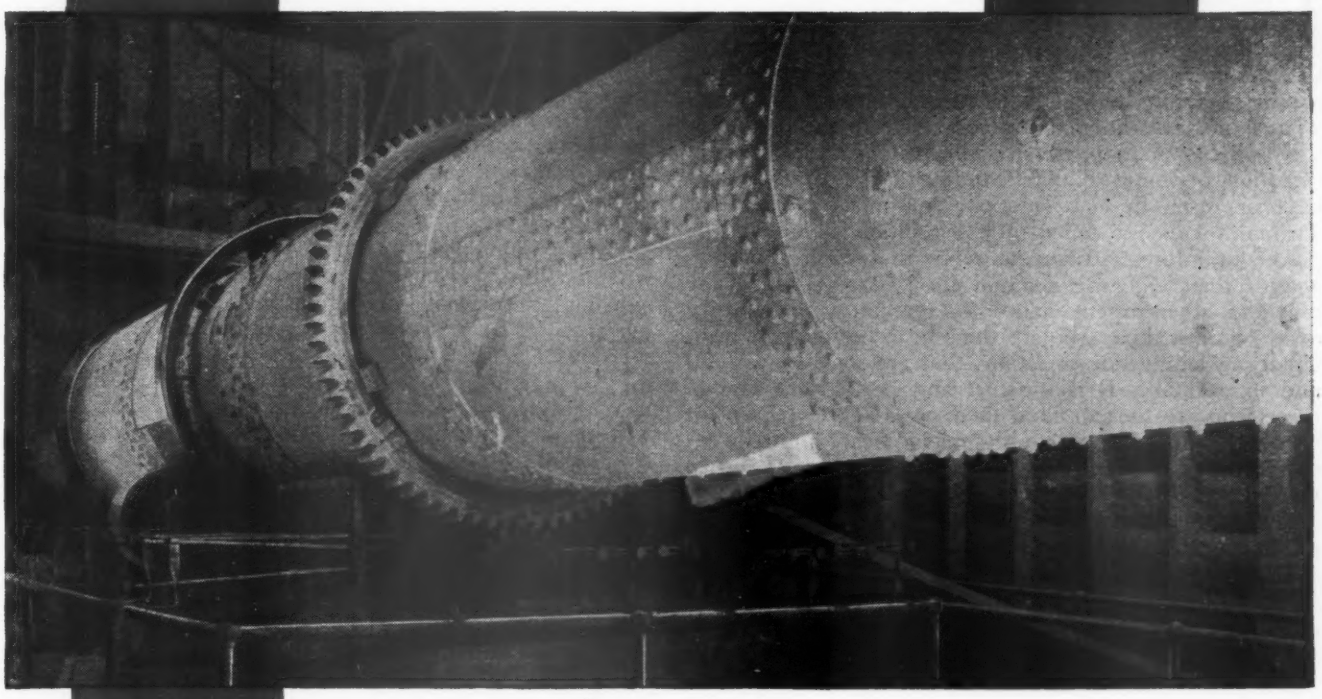

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EDITORIAL

Will Management Accept the Responsibility?

THE present state of industrial relations and the outlook for improvement are such that people in all walks of life—employers, workers, and that part of the public which is not a party to most serious industrial conflicts—are crying out that "something must be done". That is not a frame of mind conducive to the finding of a reasonable solution, nor is it likely to reduce fear and suspicion or increase understanding and friendliness. It expresses itself in such emotional outbursts as President Truman's call for emergency legislation involving the power to impress strikers to serve in certain situations against their will, the demand for passage of the Case bill, and other urgent claims for retaliatory or punitive action against those who are thought to be solely or principally to blame for conditions that are socially wasteful and unnecessary. It is the first and normal reaction of those who are hurt or hold themselves aggrieved, and it clouds an atmosphere that should be clear, if intelligent investigation and the exercise of good judgment are to result.

Instead of thoughtful consideration being given to the problems that arise in the relations between employers and workers, we see nothing more useful than accusation and denial, counteraccusation and redenial, mutual abuse and denunciation. Each side appears to be interested in divulging only enough of the truth to support what it conceives to be the justice of its position; any facts that might weaken that position are carefully concealed or so distorted that they appear as arguments for it rather than against it. That portion of the public whose good opinion is considered worth cultivating, because of its possible usefulness in aiding or preventing the enactment of restrictive laws, is treated to an exhibition of name-calling and finger-pointing that is utterly unworthy of persons of mature years and supposedly-mature intelligence.

Out of this welter of violent and vindictive writing and speaking must come something better than the sentimental and naive nonsense given out by some labor leaders, some employers and their organization spokesmen, and most editorial writers in the daily press. Somewhere some persons must be found who are capable of taking a personally-disinterested view of industrial relations, whose integrity and sense of justice are either widely-recognized or easily-demonstrable, and who can contribute to the quieting of current unrest, not the soothing-syrup of milk-and-water promises, but a new and logically-sound approach to understanding and settlement. Nowhere, so far as we are aware, has there emerged any single person with the required qualifications; nowhere does there seem to be anyone who has the knowledge and spirit needed for a task of such tremendous proportions and who enjoys the confidence of employers, workers and the otherwise-uninterested but suddenly loud-crying public.

Obviously, this is not a task for any single person or any small group of persons. It must be undertaken by men and women who have the ability and the desire to bring intelligence, fairness and patience to bear on what is our greatest national problem. The selfishness of all the parties to the conflict—employers, workers and the rest of the public—must be directed into useful channels, instead of being allowed to dissipate our production capacity, increase our stubbornness and perpetuate our animosities. That is an assignment for all three groups working in concert and with a common objective; it is far too big for any one of them striving alone.

Will management assume its part of the responsibility for finding the solution? The question is pertinent, because it has not yet done so. Regardless of the part that management has played in bringing about the conditions that our society finds so burdensome and destructive—and it is immaterial, so far as results are concerned, whether that part has been played deliberately or by omission and neglect—management must show itself willing to accept a share of the responsibility for finding a solution. The past, with its abuses, violence and increasing vengefulness, is unimportant, except as it helps us to understand present hatreds and jealousies. The future, with its great potentialities for good or ill, must have our closest and sincerest study. If industrial relations do not show great and rapid improvement, employers and employees alike may find themselves working for government instead of private enterprise and the rewards that an intelligent capitalism might provide for all may be held within the straightjacket of legal regulation.

NOT all employers or managers are unaware of this danger, although many of them act as if they thought it slight or too remote to compel the attention of men of their generation. Neither are they all ignorant of management's share of responsibility for present conditions. Speaking at the recent annual meeting of the American Management Association, its president, Alvin E. Dodd, said that "labor unrest often betokens management failure. If we are prepared to defend our right to use the labor of other men to achieve our industry, we must be prepared equally to admit the failure is chiefly ours if labor will not work in harmony that is presumably mutually advantageous." Similary evident of growing awareness and understanding on the part of employers is the statement of Melvin H. Baker, president of the National Gypsum Company, made when he addressed the Western New York Safety Conference in March and said that "protection of human lives and health, with more attention to comfort and better surroundings, is a responsibility which management must meet—labor has a right to these. Safety," he said, "in its broader meaning, must be part of developing better management-labor relations." The lack of employers' interest in the health of their workers and in the hazards that surround their work, it is proper to point out, was and continues to be a major cause of discontent in the coal-mining industry, whose recent collapse so seriously affected the country's industrial activity.

While those employers and managers who listened to the speeches mentioned applauded vigorously, it is doubtful whether they agreed with the statements quoted and whether, if they did agree, they will take any action to give effect to the principles enunciated. Yet management must give something more tangible than lip-service and tacit approval to these and other principles of sound industrial relations, if labor strife is to be anything less than a constant threat to social justice and social peace.

PIT AND QUARRY

CHICAGO JULY, 1946

Five Federal Agencies Aid N.H.A. in Handling Vets' Emergency Housing Act

National Housing Expediter Wilson W. Wyatt has announced that streamlined plans are already in operation for insuring the cooperation of all interested government agencies and industry in developing specific programs for disbursement of the $400,000,000 in premium payments authorized by the Veterans Emergency Housing Act to expand the production of building materials.

A basic Inter-Agency Organization comprised of representatives of five government agencies has been set up to coordinate general policies in relation to the Veterans Housing Program, he said. Membership will include representatives of the National Housing Expediter, the Office of Economic Stabilization, Office of Price Administration, Civilian Production Administration and the Reconstruction Finance Corporation.

Revised Freight Rates Effective July 1, 1946

The Interstate Commerce Commission recently announced a revision (effective July 1, 1946) of Ex Parte Numbers 148 and 162, originally issued in 1942, but later suspended. The revision provides for a freight rate increase of 3 per cent. throughout the country for building aggregates, with an additional 5 per cent. increase, effective only in the Official Classification Territory, which is that area lying east of the Mississippi River and north of the Ohio River. Interpretation of the revised Ex Parte by railway agents is that only ground or pulverized sand shall be given an initial increase of 6 per cent. instead of the basic 3 per cent.

Ahearn Cites Obligation Of Unions in Bargaining

At an industrial relations seminar held by the Radio Manufacturers Association in New York City Vincent P. Ahearn, executive secretary of the National Sand and Gravel Association, urged an amendment of the Wagner Act to read that collective bargaining is an obligation resting on unions as well as on managements.

Mr. Ahearn, who is a former chairman of industry members of the National War Labor Board, said that in calling for legislation to assure union responsibility, he believed that the sanctity of contracts must be maintained by both labor and management.

750,000-Ton Annual Output Expected at Pontiac Plant

Shipment of limestone from the third quarry of the Pontiac Stone Co. of Pontiac, Ill., will begin in August, according to officials. Two other quarries are operated, one at Princeville and a second northwest of Pontiac.

It is estimated that when the new quarry goes into operation at McDowell, Ill., the total annual production from the three pits will reach 750,000 tons.

Coming Events

July 17-20, 1946—Spokane. Summer convention, American Society of Civil Engineers, Davenport Hotel.

July 18, 1946—New York. Board of directors' meeting, National Crushed Stone Association, Hotel New Yorker.

July 19, 1946—New York. Board of directors' meeting, Agricultural Limestone Division, National Crushed Stone Association, Hotel New Yorker.

September 16-18, 1946—New York. 75th anniversary meeting, American Institute of Mining and Metallurgical Engineers, Waldorf-Astoria Hotel.

October 7, 1946—Chicago. 34th National Safety Congress and Exposition, Stevens Hotel.

October 16-19, 1946—Kansas City, Mo. Fall meeting, American Society of Civil Engineers.

October 23-24, 1946—Columbus, O. Industrial Minerals Division meeting, American Institute of Mining and Metallurgical Engineers, Deschler-Wallick Hotel.

Formosan Cement Plants Suffer in Breakdown Of Island's Industries

The island of Formosa, formerly called the rice basket of the Japanese empire, is experiencing an almost complete breakdown of its industrial and agricultural life. Throughout the 240-mile-long isle, whose cement production once reached 12,000 barrels a day, the present output of the declining cement industry is now estimated at about 1,000 barrels daily. Old machinery, lack of maintenance and forced employment of Japanese labor are among the major causes of the steadily shrinking production figures.

Other conditions contributing to the declining industrial activity on Formosa were the bombing of Japanese-owned factories by American air forces, the desertion of unharmed plants by workers and skilled technicians and the destruction of the island's rolling stock by strafing planes. Many of the island's largest plants, which might have become vital factors in the building of China's industrial future, are today empty shells, stripped by looters and falling into complete decay.

A. J. Anderson of Palo Alto, Calif., who is employed by an American firm as an engineer under contract to the Chinese government, is at present engaged in conducting an industrial survey of Formosa. He has reported that it will require $5,000,000 to restore the huge plant of the Japan Mining Co. at Kiirun if needed repairs are made at once. If the repairs cannot be completed within a year, says Mr. Anderson, neglect, rust and decay will have made such inroads upon the plant that it will be utterly valueless. The condition of this plant is typical of Formosa's entire industrial setup.

After a two-year shutdown, the Horton Stone Co. of Springfield, Mo., was reopened by the owner, George Horton. The output of the 58-year-old firm, according to Mr. Horton, will be doubled and will soon be raised to 60 tons per hour. The reopening of the Horton plant brought relief to this area, where an acute shortage of crushed stone has existed.

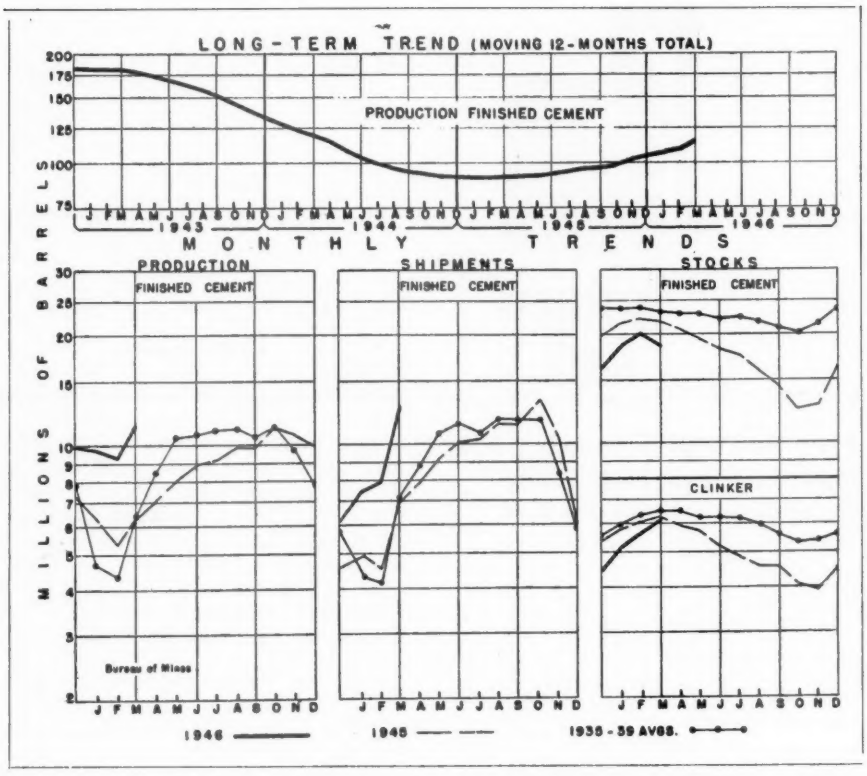
Construction Volume Continues Upward Trend During April

Construction contracts were awarded for 52,733 projects costing $734,911,000 in the 37 states east of the Rocky Mountains in April, to top March's total of $697,593,000 and that of April of last year, which amounted to $395,798,000, it was reported today by F. W. Dodge Corporation.

That architects, engineers and building organizations are breaking construction records established during the war years by substantial amounts is reflected in the dollar volume totals for the first four months. This year's January-April contracts amounted to $2,177,404,000 in the Eastern States, as compared with $1,859,944,000 in the corresponding period of 1942, when wartime volume was highest.

Residential construction contracts in April totaled $370,590,000, which represented an eightfold gain over the corresponding month of last year, and a gain of nearly $100,000,000 over March. More than 50,000 residential units are called for in the April awards, all but 2 per cent., as measured by dollar volume, being private construction, as differentiated from publicly-owned dwellings.

Nonresidential building declined slightly in April from March's total and that of April last year, reflecting an anticipated trend resulting from the Civilian Production Administration's Veterans Housing Program Order No. 1 issued on March 26. The order is designed to channel materials into homes costing $10,000 or less and away from nonessential and deferrable nonhousing construction. The comparative nonresidential construction contract totals follow: April, 1946, $236,182,000; March, 1946, $278,725,000; April, 1945, $241,107,000.



Production of 11,299,000 barrels of cement in March, 1946, reported to the U. S. Bureau of Mines, was 77 per cent. greater than reported for March, 1945. Shipments of 12,698,000 barrels were 82 per cent. greater than those reported for the corresponding month of 1945. The increasing tempo of both production and shipments reflects growing activity in the construction industries. Mill stocks on March 31, 1946, were 7 per cent. lower than at the end of February, 1946, and 14 per cent. lower than a year ago. Clinker production of 11,981,000 barrels in March, 1946, was 83 per cent. above that reported for March, 1945. The industry operated at 55 per cent. of capacity in March, 1946, whereas a year earlier it was operating at only 31 per cent. of capacity. Cumulative figures for the first three months of 1946 show a gain of 66 per cent. in production, 70 per cent. in shipments, and 70 per cent. in clinker production, as compared with the similar period of 1945. The demand for cement, as indicated by mill shipments, was higher than in March, 1945, in all districts. In about one-half of the districts shipments were more than double those of March, 1945.

Grand Rapids to Have New $100,000 Aggregates Business

The formation of a new $100,000 sand, gravel and ready-mixed concrete business, to be known as the Rocks Sands & Gravel Co. has been announced by Gerald J. Rocks of Grand Rapids and J. W. Hobeck of Holland, Mich. In addition to plants to be operated at three locations in Grand Rapids, the partner will later open a fourth in another part of the city.

Mr. Rocks, who was for 21 years associated with the Grand Rapids Gravel Co. as secretary and sales manager, has recently returned from a three months' stay in California, where he observed operations at the Henry J. Kaiser plants. Mr. Hobeck has been a road contractor for the last 25 years.

Michigan Limestone-Chemical Plans Plant at Cedarville

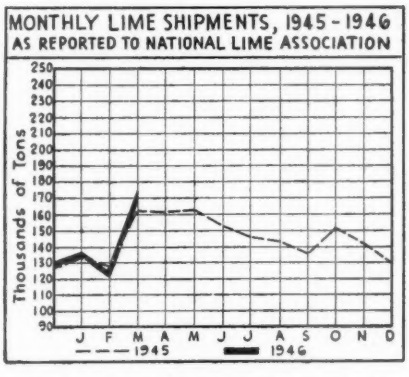
Plans for the erection of a plant on newly-acquired property of the Michigan Limestone & Chemical Co. were announced by officials of the firm recently. The new tract, purchased from the Ford Motor Co. at Cedarville, Mich., is near Lake Huron.

Operations at the new site will be on a plan similar to that of the plant at Calcite, Mich., where work was resumed late in May after a shut-down due to the critical coal shortage.

American Rock Wool Erects First of Five New Cupolas

Construction has begun at the American Rock Wool Company's new cupola addition at Wabash, Ind., which is to house, in addition to the cupola, a waste heat boiler and the necessary auxiliary equipment. The addition is the first of five new units to be installed at the Wabash plant. It is estimated that the new facilities will increase the basic output by 25 per cent. Bins and equipment for mechanical charging and the construction of a second oven are included in future expansion plans.

The Southern Phosphate Corp. announces the transfer of its sales office from 342 Madison Ave., New York City, to its home office at Bartow, Fla., which occurred on April 22, 1946.



According to data collected by the National Lime Association, 47 companies in March, 1946, shipped 170,800 tons of lime (96,740 quicklime; 74,060 hydrate). Reporting companies represent 42.5 per cent. of the association members' total capacity of record. Based on Pit and Quarry's estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 442,000 tons. Shipments of lime by users for January, 1946, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,931	27,081
Building	12,751	24,223
Chemical	80,058	22,756
Total	96,740	74,060

Dr. Bates Named Head Of New P.C.A. Division For Research Activity

The Portland Cement Association, through its president, Frank T. Sheets, has announced plans for an immediate and marked expansion of its research and development activities in the field of Portland cement, concrete and their engineering applications. To assure adequate financing and continuity of this expanded program over the years, the member companies have formally adopted by-law amendments setting aside a substantial part of the Association's yearly income to be used solely for research and development work.

Mr. Sheets indicated that a newly created Division of Research and Development would be administered by a vice-president responsible only to the president.

To fill this important post, the Association sought an outstanding scientist and chemical engineer with a broad experience in industrial research. Such a person was found in Dr. A. Allan Bates, whose election as vice-president for research and development now has been announced.

Dr. Bates is widely known for his accomplishments in the fields of chemistry, chemical engineering, ceramics and metallurgy. Since 1938 he has been manager of the Chemical, Metallurgical and Ceramic Research Division of the Westinghouse Electric Corporation.

During World War II, at the request of the United States Government, he was on two occasions on temporary leave of absence from Westinghouse, and performed two highly important services, one a special technical mission for the State Department in South America, another a secret scientific intelligence operation for the U. S. Army in the combat zone of Germany.

In addition to having had broad experience in scientific research, Dr. Bates has had a thoroughgoing education in the fundamental sciences. He holds a Bachelor of Arts degree from Ohio Wesleyan University, where he majored in chemistry; Bachelor of Science in metallurgical engineering from Case School of Applied Science; Doctor of Science, "Magna cum laude", from the University of Nancy, France; and an honorary degree of Doctor of Engineering from Stevens Institute of Technology. He is also a member of various scientific societies, and because of his outstanding scholastic accomplishments was elected to the honorary scientific fraternities Tau Beta Pi and Sigma Xi. For ten years prior to entering the service of Westinghouse, Dr. Bates had been Professor of Metallurgical Engineering at Case School of Applied Science.

In commenting on Dr. Bates's election as vice-president for research and development and on the Association's expanded program, President Sheets said that the Association's research findings and new developments will be made freely available for the use of engineers, architects, contractors, public officials and the general public. All new discoveries and patentable inventions will be dedicated to the public and made widely and freely available for general use.

Dr. A. Allan Bates

He stressed the fact that the P. C. A. had pioneered in research and product development for many years.

Kaiser Speeds Building Of New Gypsum Plant

Foundation construction is being rushed on Henry J. Kaiser's new Standard Gypsum Company of California wallboard plant at Long Beach, Calif., the first of several gypsum producing facilities to be built under an agreement concluded in 1944 between Mr. Kaiser and Samuel A. Perkins, president of Standard Gypsum Company, Inc.

The development at Long Beach is being accelerated in order to provide badly needed materials for the West Coast's booming building program. Officials pointed out that the Civilian Production Authority had approved continuation of construction under the "freeze order."

The original Long Beach mill, which has produced Standard plaster products for many years, will be completely overhauled. Processing plants will secure gypsum from deposits on San Marcos Island in the Gulf of Lower California, which are estimated to contain 500,000,000 tons of gypsum.

Reports from the Colorado Portland Cement Co. plant near Fort Collins, Colo., state that the firm cannot keep up with its orders. The 15,000 barrels of cement on hand February 1 have been shipped out, and deliveries are being made from the production of 66 tons a day.

American Aggregates Plans $100,000 Plant After Kalamazoo Fire

Plans for a new $100,000 plant were announced by the American Aggregates Corp. of Greenville, O., to replace the one destroyed by fire seven miles north of Kalamazoo, Mich., on April 28. Ground was broken for the new buildings soon after the fire, and operations are expected to be resumed this summer. The new facilities will include a tunnel-type plant, with concrete storage silos. Washing and screening will be done on top of the silos. Nearly all of the plant equipment will be new, as only a few pieces were saved from the blaze. The origin of the fire, which caused damage amounting to $125,000, is still unknown. A $75,000 rebuilding program had just been completed.

According to P. E. Mills, manager of the plant, American Aggregates was shipping 50 carloads of material per day before the fire.

Florida Road Builders Vote Change of Name

What formerly was the Florida Section, American Road Builders Association, now is the Florida Road Builders Association. The group continues its affiliation with the national organization. The name change was voted at a meeting held in Ocala, attended by representatives of materials and equipment firms and contractors.

Alex E. Brest of Jacksonville was elected president of the association; W. Harry Armston of Dinedin, vice-president, and R. L. Bannerman of Tallahassee, secretary-treasurer.

Converted Oil Barge Now A Sand-Gravel Carrier

The Mid-Columbia Sand & Gravel Co. of The Dalles, Ore., has pioneered in the use of barge transport on the upper Columbia River. Using the first converted steel oil barge ever put to such service, the firm has been receiving sand and gravel from Vancouver, Wash. At The Dalles a clamshell shovel unloads the barge at the company's newly-acquired stockpile area.

Scheduled for immediate erection is a new concrete plant on the Mid-Columbia property. A concrete block plant is also planned, according to W. N. Dielschneider, Mid-Columbia manager.

Boron Production in U. S. Shows Steady Rise

The production of boron minerals in the United States, which has been steadily mounting since the wartime low of 226,723 short tons in 1942, reached 325,935 tons in 1945. In normal times the United States, the world's main source of boron minerals, exports one-third to one-half of production. The dollar value of the 1945 boron output reached $7,635,365.

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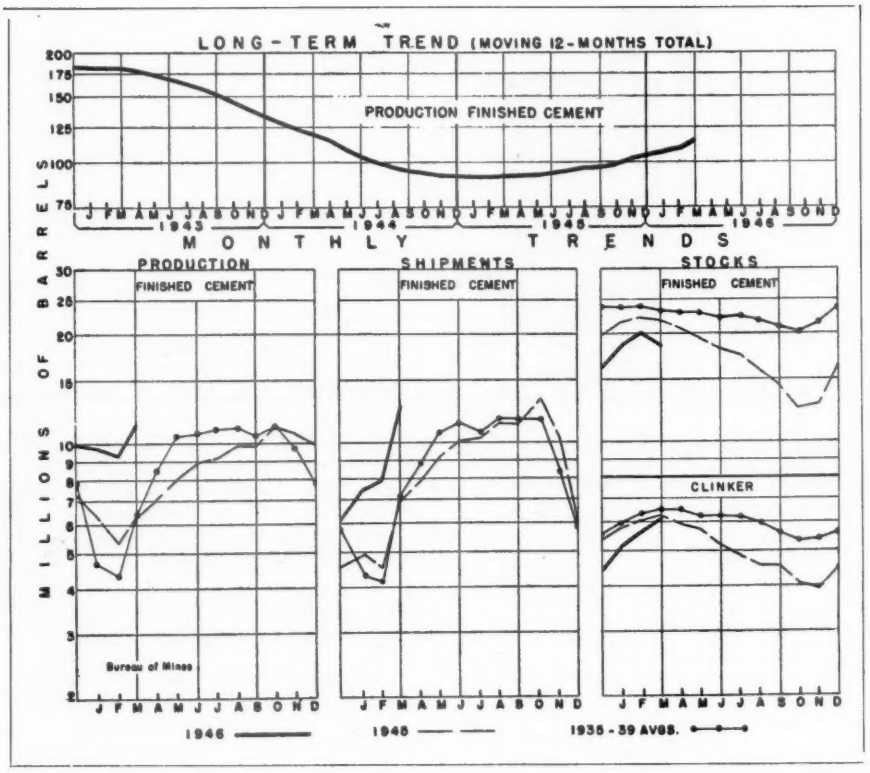
Residential construction contracts in April totaled $370,590,000, which represented an eightfold gain over the corresponding month of last year, and a gain of nearly $100,000,000 over March. More than 50,000 residential units are called for in the April awards, all but 2 per cent., as measured by dollar volume, being private construction, as differentiated from publicly-owned dwellings.

Nonresidential building declined slightly in April from March's total and that of April last year, reflecting an anticipated trend resulting from the Civilian Production Administration's Veterans Housing Program Order No. 1 issued on March 26. The order is designed to channel materials into homes costing $10,000 or less and away from nonessential and deferrable nonhousing construction. The comparative nonresidential construction contract totals follow: April, 1946, $236,182,000; March, 1946, $278,725,000; April, 1945, $241,107,000.



Production of 11,299,000 barrels of cement in March, 1946, reported to the U. S. Bureau of Mines, was 77 per cent. greater than reported for March, 1945. Shipments of 12,698,000 barrels were 82 per cent. greater than those reported for the corresponding month of 1945. The increasing tempo of both production and shipments reflects growing activity in the construction industries. Mill stocks on March 31, 1946, were 7 per cent. lower than at the end of February, 1946, and 14 per cent. lower than a year ago. Clinker production of 11,981,000 barrels in March, 1946, was 83 per cent. above that reported for March, 1945. The industry operated at 55 per cent. of capacity in March, 1946, whereas a year earlier it was operating at only 31 per cent. of capacity. Cumulative figures for the first three months of 1946 show a gain of 66 per cent. in production, 70 per cent. in shipments, and 70 per cent. in clinker production, as compared with the similar period of 1945. The demand for cement, as indicated by mill shipments, was higher than in March, 1945, in all districts. In about one-half of the districts shipments were more than double those of March, 1945.

Grand Rapids to Have New $100,000 Aggregates Business

The formation of a new $100,000 sand, gravel and ready-mixed concrete business, to be known as the Rocks Sands & Gravel Co. has been announced by Gerald J. Rocks of Grand Rapids and J. W. Hobeck of Holland, Mich. In addition to plants to be operated at three locations in Grand Rapids, the partner will later open a fourth in another part of the city.

Mr. Rocks, who was for 21 years associated with the Grand Rapids Gravel Co. as secretary and sales manager, has recently returned from a three months' stay in California, where he observed operations at the Henry J. Kaiser plants. Mr. Hobeck has been a road contractor for the last 25 years.

Michigan Limestone-Chemical Plans Plant at Cedarville

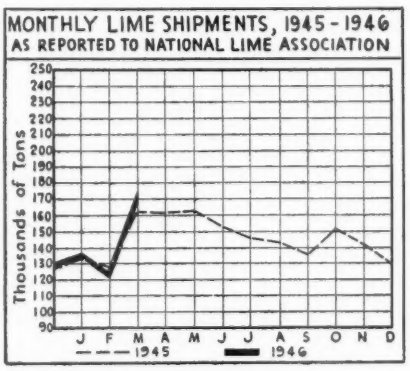
Plans for the erection of a plant on newly-acquired property of the Michigan Limestone & Chemical Co. were announced by officials of the firm recently. The new tract, purchased from the Ford Motor Co. at Cedarville, Mich., is near Lake Huron.

Operations at the new site will be on a plan similar to that of the plant at Calcite, Mich., where work was resumed late in May after a shut-down due to the critical coal shortage.

American Rock Wool Erects First of Five New Cupolas

Construction has begun at the American Rock Wool Company's new cupola addition at Wabash, Ind., which is to house, in addition to the cupola, a waste heat boiler and the necessary auxiliary equipment. The addition is the first of five new units to be installed at the Wabash plant. It is estimated that the new facilities will increase the basic output by 25 per cent. Bins and equipment for mechanical charging and the construction of a second oven are included in future expansion plans.

The Southern Phosphate Corp. announces the transfer of its sales office from 342 Madison Ave., New York City, to its home office at Bartow, Fla., which occurred on April 22, 1946.



According to data collected by the National Lime Association, 47 companies in March, 1946, shipped 170,800 tons of lime (96,740 quicklime; 74,060 hydrate). Reporting companies represent 42.5 per cent. of the association members' total capacity of record. Based on Pit and Quarry's estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 442,000 tons. Shipments of lime by users for January, 1946, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,931	27,081
Building	12,751	24,223
Chemical	80,058	22,756
Total	96,740	74,060

Dr. Bates Named Head Of New P.C.A. Division For Research Activity

The Portland Cement Association, through its president, Frank T. Sheets, has announced plans for an immediate and marked expansion of its research and development activities in the field of Portland cement, concrete and their engineering applications. To assure adequate financing and continuity of this expanded program over the years, the member companies have formally adopted by-law amendments setting aside a substantial part of the Association's yearly income to be used solely for research and development work.

Mr. Sheets indicated that a newly created Division of Research and Development would be administered by a vice-president responsible only to the president.

To fill this important post, the Association sought an outstanding scientist and chemical engineer with a broad experience in industrial research. Such a person was found in Dr. A. Allan Bates, whose election as vice-president for research and development now has been announced.

Dr. Bates is widely known for his accomplishments in the fields of chemistry, chemical engineering, ceramics and metallurgy. Since 1938 he has been manager of the Chemical, Metallurgical and Ceramic Research Division of the Westinghouse Electric Corporation.

During World War II, at the request of the United States Government, he was on two occasions on temporary leave of absence from Westinghouse, and performed two highly important services, one a special technical mission for the State Department in South America, another a secret scientific intelligence operation for the U. S. Army in the combat zone of Germany.

In addition to having had broad experience in scientific research, Dr. Bates has had a thoroughgoing education in the fundamental sciences. He holds a Bachelor of Arts degree from Ohio Wesleyan University, where he majored in chemistry; Bachelor of Science in metallurgical engineering from Case School of Applied Science; Doctor of Science, "Magna cum laude", from the University of Nancy, France; and an honorary degree of Doctor of Engineering from Stevens Institute of Technology. He is also a member of various scientific societies, and because of his outstanding scholastic accomplishments was elected to the honorary scientific fraternities Tau Beta Pi and Sigma Xi. For ten years prior to entering the service of Westinghouse, Dr. Bates had been Professor of Metallurgical Engineering at Case School of Applied Science.

In commenting on Dr. Bates's election as vice-president for research and development and on the Association's expanded program, President Sheets said that the Association's research findings and new developments will be made freely available for the use of engineers, architects, contractors, public officials and the general public. All new discoveries and patentable inventions will be dedicated to the public and made widely and freely available for general use.

Dr. A. Allan Bates

He stressed the fact that the P. C. A. had pioneered in research and product development for many years.

Kaiser Speeds Building Of New Gypsum Plant

Foundation construction is being rushed on Henry J. Kaiser's new Standard Gypsum Company of California wallboard plant at Long Beach, Calif., the first of several gypsum producing facilities to be built under an agreement concluded in 1944 between Mr. Kaiser and Samuel A. Perkins, president of Standard Gypsum Company, Inc.

The development at Long Beach is being accelerated in order to provide badly needed materials for the West Coast's booming building program. Officials pointed out that the Civilian Production Authority had approved continuation of construction under the "freeze order."

The original Long Beach mill, which has produced Standard plaster products for many years, will be completely overhauled. Processing plants will secure gypsum from deposits on San Marcos Island in the Gulf of Lower California, which are estimated to contain 500,000,000 tons of gypsum.

Reports from the Colorado Portland Cement Co. plant near Fort Collins, Colo., state that the firm cannot keep up with its orders. The 15,000 barrels of cement on hand February 1 have been shipped out, and deliveries are being made from the production of 66 tons a day.

American Aggregates Plans $100,000 Plant After Kalamazoo Fire

Plans for a new $100,000 plant were announced by the American Aggregates Corp. of Greenville, O., to replace the one destroyed by fire seven miles north of Kalamazoo, Mich., on April 28. Ground was broken for the new buildings soon after the fire, and operations are expected to be resumed this summer. The new facilities will include a tunnel-type plant, with concrete storage silos. Washing and screening will be done on top of the silos. Nearly all of the plant equipment will be new, as only a few pieces were saved from the blaze. The origin of the fire, which caused damage amounting to $125,000, is still unknown. A $75,000 rebuilding program had just been completed.

According to P. E. Mills, manager of the plant, American Aggregates was shipping 50 carloads of material per day before the fire.

Florida Road Builders Vote Change of Name

What formerly was the Florida Section, American Road Builders Association, now is the Florida Road Builders Association. The group continues its affiliation with the national organization. The name change was voted at a meeting held in Ocala, attended by representatives of materials and equipment firms and contractors.

Alex E. Brest of Jacksonville was elected president of the association; W. Harry Armston of Dinedin, vice-president, and R. L. Bannerman of Tallahassee, secretary-treasurer.

Converted Oil Barge Now A Sand-Gravel Carrier

The Mid-Columbia Sand & Gravel Co. of The Dalles, Ore., has pioneered in the use of barge transport on the upper Columbia River. Using the first converted steel oil barge ever put to such service, the firm has been receiving sand and gravel from Vancouver, Wash. At The Dalles a clamshell shovel unloads the barge at the company's newly-acquired stockpile area.

Scheduled for immediate erection is a new concrete plant on the Mid-Columbia property. A concrete block plant is also planned, according to W. N. Dielschneider, Mid-Columbia manager.

Boron Production in U. S. Shows Steady Rise

The production of boron minerals in the United States, which has been steadily mounting since the wartime low of 226,723 short tons in 1942, reached 325,935 tons in 1945. In normal times the United States, the world's main source of boron minerals, exports one-third to one-half of production. The dollar value of the 1945 boron output reached $7,635,365.

States Vote Large Sums For Post-War Highway Improvement Projects

Recent reports from state highway commissions and departments, as well as announcements made by governors of several states, indicate that interest in highway improvement is mounting in many sections.

Iowa—Plans for the expenditure of at least $106,000,000 on Iowa highway construction by the end of 1948 have been announced by Gov. Robert D. Blue. Included will be $45,529,000 for primary roads, and $60,546,000 for secondary roads, he said. In addition to the $106,000,000 in sight, he pointed out that Iowa may obtain $18,000,000 more from a 1-cent gasoline tax increase imposed by the 1945 state legislature but now being challenged in the courts. If this extra tax is upheld, he said the expenditure for Iowa roads in the next two and a half years can go to $124,000,000.

New York—New York State Public Works Superintendent Charles H. Sells recently announced state plans for a $69,000,000 through-way and city arterial-route construction program for the Buffalo urban area. The construction of 11 arterial routes through Buffalo is contemplated to relieve the principal flow of traffic congestion. Cost of the state-financed city routes is estimated at $23,545,000, of which the state will pay $19,288,000; and Buffalo's taxpayers will furnish $4,257,000, for one-half the cost. The entire $46,000,000 for construction of the Erie-Ontario and Niagara throughways in the Buffalo urban area will come from state funds.

Montana—As the initial step in launching Montana's $46,000,000 three-year, post-war highway construction and improvement program, the Montana State Highway Commission has approved a $1,500,000 debenture bond issue to retire outstanding bonds. It was announced that about $3,000,000 of still outstanding debenture bonds will be retired September 15 with proceeds of the new bond issue and reserved sinking funds.

Louisiana—Louisiana's legislature, which opened its regular 1946 session May 13, was urged by Gov. James H. Davis to favor a $25,000,000 state bond issue for highway improvements.

The bond revenue, Governor Davis said, could be used to match $15,000,000 authorized for Louisiana highways by the Federal Government.

Arizona—More than $8,000,000 of appropriations for highway construction will be included in Arizona's highway budget for 1946-47, according to announcement released by Gene Eagles, secretary of the state highway commission. He explained this figure includes all state, county and Federal funds which are estimated to be available during the year.

Utah—Substantial increases in Utah highway revenues were recently proposed to the state legislative tax study commission by the advisory committee to the Utah State Road Commission. Submitted by former State Senator George M. Miller of Price, the proposals call for an increase in the state gasoline tax from 4 cents to 6 cents a gallon, a reduction of the evaporation allowance from 3 per cent. to 1 per cent., and revision of the law to increase the fuel tax paid by users of Diesel oil. Estimates were that these changes would increase revenues available for state highway construction from about $5,000,000 to $7,750,000 a year.

South Carolina—A $6,000,000 secondary road building program, to start July 1, was approved by the South Carolina State Highway Commission at a recent meeting. The South Carolina commission also elected a new chairman and vice-chairman and installed five new commissioners. J. L. Caudle of McCormick was named chairman, succeeding W. H. Daniels of Mullins, while W. G. DesChamps of Bishopville was elected vice-chairman to succeed G. M. Neeley of Denmark.

Kentucky—The Kentucky State Highway Department has announced contracts for 269 miles of road surfacing and for bridge improvements totaling $1,653,608. The contracts included the first of the groups of rural roads that are to be improved in a new highway program.

Electronic Chronoscope Measures Speed of Blast

Dr. R. R. Sayers, Director of the Bureau of Mines, has announced the invention of an electronic chronoscope, capable of measuring the speed of detonation of explosives to within one-millionth of a second. C. R. Nisewanger and F. W. Brown, Bureau physicists stationed at Bruceton, Pa., are responsible for the development of this device and have assigned the patent rights to the Secretary of the Interior. The instrument, which gives instantaneous detonation wave readings on a single meter, is portable, simple, rugged in design, and can be used for either laboratory or field measurements. It is reported to be invaluable when the explosive charge is small, confined, or undesirably shaped.

Illinois Fluorspar Mines Reopen After Shutdown

Operations at fluorspar and mica mines in the Elizabethtown, Ill., area were resumed recently after temporary shutdowns due to lack of coal. The Rosiclare Lead & Fluorspar Mining Co. had not been operated since April 6. (The company furnishes electricity to other mines and to the cities of Rosiclare and Elizabethtown.)

The Mahoning Mining Co. at Rosiclare resumed work at the pellet plant, the flotation mill and the mine. Employees of the fluorspar division of the Inland Steel Co. at Rosiclare, closed since April 6, came back to their jobs with a 10-cents-an-hour wage increase.

M. C. Emery, former owner and manager of the Emery Sand & Gravel Co. of Moorhead, Minn., has announced the sale of his plant and business to Tom Hellander and George Wallace.

Lime Association Presents Rutgers Fellowship Grant For Water Wastes Research

The National Lime Association has established a fellowship at Rutgers University in the department of Sewage and Waste Treatment, as a continuation of work that has been carried on for some time by the National Lime Association. The fellowship is under the direction of Dr. Willem Rudolfs, who selected R. P. Logan, a former National Lime Association fellow, to be directly in charge of the project. R. Y. LeVine, Ch. E., a graduate student, is carrying out the laboratory work.

The program is concerned with the utilization of various types of lime products in the treatment of water wastes. An important phase of the work is the study of the utilization of lime in the treatment of pickling liquor such as is obtained from steel producing and fabricating centers. Particular emphasis is being placed on the difficult sludge problem that is associated with this neutralization.

In addition to the work on pickling liquor, a study is being made of the neutralization of the various types and mixtures of acids present in industrial waste products. Here again specific emphasis is being placed on methods of avoiding the formation of high sludge volumes.

Another section of the work is devoted to a consideration of the various types of equipment which may be employed in the lime treatment. For example, consideration is being given to various types of lime feeders, mechanical slakers, sludge production and disposal apparatus, and to several kinds of mixing equipment.

Vets Get Good Ratings From Their Employers

A recent survey, conducted by the Veterans Administration, shows that disabled veterans may be successfully employed in industry if they are placed on a selected job of work they can best perform. Sixty-six per cent. of the firms consulted declared these vets to be as efficient as physically normal workers, 24 per cent. rated them better than average, and only 10 per cent. reported them below average in efficiency.

A private survey by a large Eastern university confirmed the findings of the V.A. Both surveys established the fact that the handicapped had a lower accident rate, a lower rate of absenteeism, and a lower labor turnover than the average worker. Many employers have stated that the vets are production assets instead of liabilities, if they are carefully selected for the work.

On the question of second injuries producing total disability and increased compensation costs, the V.A. reveals that many states have established second-injury funds, relieving employers of at least a part of the cost of total disability resulting from a second injury.

Midwest Agricultural Limestone Institute Meets at Springfield

The annual meeting of the Midwest Agricultural Limestone Institute was held in Springfield, Ill., on June 14, with E. J. Krause, president presiding. The firms represented included the Columbia Quarry Company, the Consumers Company, the Dolese & Shepard Company, the East St. Louis Company, the Elmhurst-Chicago Stone Company, the France Stone Company, the Lehigh Stone Company, the Lamar Stone Company, the Pontiac Stone Company, the National Stone Company and the Newton County Stone Company.

The following officers were elected: E. J. Krause, president; W. N. Carter, vice-president; H. A. Clark, treasurer; and F. W. Mumma, secretary. A. T. Goldbeck, engineering director of the National Crushed Stone Association, and his assistant, J. E. Gray, who were guests, spoke at the afternoon session.

Second U. S. Highway Grant Speeds Federal-Aid Work

Major General Philip B. Fleming, Federal Works Administrator, has announced apportionment of the second $500,000,000 of the $1,500,000,000 fund authorized by the Federal-Aid Highway Act of 1944 to assist the states in developing a $3,000,000,000 highway program. The funds are for the fiscal year beginning July 1, and will remain available for obligation to specific projects for two years.

The initial $500,000,000 authorization, for the current fiscal year, became available last October, when Congress declared, by resolution, that the war emergency had abated sufficiently to permit state highway departments and the Public Roads Administration to launch the post-war highway program. A third authorization of $500,000,000 will become available on July 1, of next year.

During April the state highway departments let 392 contracts for Federal-aid road work that will cost $55,932,506. In May, 425 contracts were let for projects that will cost $58,166,360. During the five-month period from January 1, to May 31, a total of 1,230 contracts were let for approximately $185,900,000 worth of improvements on the Federal-aid system. At the end of May, a total of 68 contracts for work costing $12,581,000 were under construction.

First Post-War Issues of Mineral Reports Released

Reports describing results of the investigation of mineral deposits or mines in different sections of the United States by the Bureau of Mines were released for distribution recently.

Publication of the reports was not feasible during the war, but they now are being made available to the public and the minerals industries as fast as possible. Five reports deal with lead-zinc ores, fluorspar, tin and tungsten. The fluorspar report is described as follows:

Report of Investigations 3854, Exploration of the Gallinas Fluorspar Deposits, Lincoln County, New Mexico, covers exploration work in February and April, 1943, and was undertaken because of the possible importance of newly discovered deposits.

Reports on investigations of minerals deposits or mines in the southeastern area of the United States include the following on sand:

Report of Investigations 3859, Investigation of the McLeod Glass-Sand Pits, Wheeler County, Ga., which describes the Bureau's exploration of this property and also presents a chemical and sizing analysis of the sands.

Report of Investigations 3865, Investigation of the Miami-West Palm Beach Belt of Silica Sand in Florida, discloses that important quantities of silica sand suitable for the production of high-quality glass are available in the Miami-West Palm Beach area.

Copies of each report may be obtained free by applying to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

A.S.C.E. Fall Meeting Scheduled at Kansas City

Kansas City, Mo., has been awarded the 1946 fall meeting of the American Society of Civil Engineers, it was announced by Col. William N. Carey, secretary and executive officer, at national headquarters in New York.

Dates of the meeting are October 16-19. Several technical sessions, at which water supply, sewage disposal, highways, airports, city planning and other civil engineering matters will be discussed, will mark the session. At a general meeting on the opening day, W. W. Horner, national president, will speak.

John C. Long, of the Kansas City construction company bearing his name, is president of the Kansas City local section of the Society, which will be host to the meeting.

O.P.A. Publishes Ruling on Out-of-Area Cement Sales To Relieve Shortages

The Office of Price Administration on June 10 announced provisions for out-of-area sales of cement.

Prices for shipment of cement from one area to another have been raised by the action to reflect area increases granted in previous OPA actions. The new ceilings for out-of-area sales went into effect June 15, 1946.

The action also permits out-of-area sales to be made by any person provided that the purchaser, who resells the cement in the same form, absorbs the additional cost. Prior to this, out-of-area sales were limited to sales to certain war procurement agencies, a type of sale now obsolete. But local shortages have been reported which can be eased by shipments of cement from surplus areas.

Ceiling prices affected by the order now reflect the 20-cents-per-barrel adjustment in Districts 1, 8, and 10, and the 30-cents-per-barrel adjustment previously allowed Arizona, southeastern Nevada and southern California. The maximum prices f.o.b. mill are listed in dollars and cents in the action and range from $1.43 per barrel for District 11 (northern California and Nevada, except southeastern Nevada) to $1.93 for District 10 (Colorado, Utah, Montana, Idaho, Wyoming, New Mexico).

Morrison-Knudson Fire Damages Plant, Materials

The main building at the Morrison-Knudson Co., Inc., granite crushing quarry at Granite Canyon, near Cheyenne, Wyo., was recently damaged by fire to the extent of "several thousand dollars," according to company officials. The flames reportedly were caused by welding that had been done shortly before the fire began in the screening plant. The south side of the main building was partially burned, including the master switch which controlled some 100 motors.

Materials within the building, which is one of 20 making up the Granite Canyon plant, were badly damaged, and the screening plant was put out of commission. The company has a contract with the Union Pacific railroad to furnish ballast for road beds.

1945 California Cement Output 15,922,772 Barrels

During 1945 the cement production figures of California rose to 15,922,772 barrels, with a dollar value of $23,469,027 f.o.b. plant. The year's output was an increase in both amount and value over that of 1944, which was reported as 14,599,752 barrels, valued at $21,249,520. The annual capacity of the California cement mills, according to the U. S. Bureau of Mines, was 27,740,000 barrels as of January 1, 1946, as compared with 27,390,000 barrels for January 1, 1945. An average of 2,300 men were employed in California's 11 mills.

Natl. Gypsum Expansion Program Cost Increased Nearly 100 Per Cent.

The National Gypsum Co. has announced plans for increasing to $16,500,000 its outlay for post-war expansion. The company previously had announced plans for an $8,500,000 expansion program.

About $1,000,000 is to be spent for expansion and modernization of the company's mine and plant at Clarence Center, N. Y. Mechanical equipment to be installed will increase the plant's production by 33 per cent. and will result in a 25 per cent. increase in employment.

It has been estimated that, due to increased costs in construction, the gypsum mill at Baltimore will necessitate an expenditure of $4,000,000 (instead of the previous estimate of $2,600,000). The lime plant at Kimballton, Va., will cost $3,000,000 (instead of the previous estimate of $1,502,530). Thus an aggregate of $7,000,000 is required for these plants.

1944 Minerals Yearbook Now Available to Public

The 1944 edition of *Minerals Yearbook*, authoritative publication on domestic and foreign mineral commodities, is now available for public distribution. Prepared annually by the Economics and Statistics Branch of the Bureau, the *Yearbook* was withheld from general distribution during the war because of the censorship on foreign trade information and other data of possible value to the enemy.

Bound copies of the 1944 *Yearbook* may be obtained for $3 each from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Separate chapters also may be obtained from the Superintendent of Documents for prices ranging from 5 to 15 cents.

Building Trade Boom Anticipated in 1947

$1,000,000,000 increase in non-residential construction during 1946-47, even with the limitation order curtailing non-essential and deferrable projects, is scheduled under the Veterans Emergency Housing Program.

Moreover, current estimates of the Bureau of Labor Statistics indicate that at the peak of the housing program in 1947 almost twice as many workers will be needed for non-residential construction as are now employed in that type of building. In other words, there will be *more*, not *less*, employment, building and investment in the heavy-construction non-residential fields. Fears that the limitation order signifies a stoppage of heavy-construction building are unfounded and based on a misunderstanding of the order and of the building program, according to National Housing Expediter Wilson W. Wyatt.

The effect of the limitation order, he explained, will be to screen out non-essential and deferrable commercial and industrial construction such as night clubs, race tracks, motion picture theaters. On the other hand, materials and manpower will be made available to essential projects such as schools, hospitals, highways, streets, sewers and other utilities needed in support of the housing program as well as industrial plants producing needed materials or providing needed employment.

List Refractory Items Freed from O.P.A. Control

Suspension from price control of the following products was announced by the Office of Price Control; basic refractory brick, crude and ground refractory fireclay, fireclay brick, hot tops, ladle brick, silica brick, silica cement, sleeves and nozzles, super clay and high alumina refractories.

The release of these products from price controls is most important. Most of them are sold to industrial users and constitute only an insignificant part of business costs or of the cost of living. Moreover, the supply is adequate and no shortage is expected. In addition, the market for these items is limited to the industries supplied; and both the labor and raw materials used in making them are not competitive with those used outside this part of the industry. For these reasons there is no danger of diversion from production of other refractory products nor from other industries as the result of the action of the O.P.A.

17th Natl. Power Show Scheduled December 2-7

The 17th National Exposition of Power and Mechanical Engineering, better known as the National Power Show, will be held in Grand Central Palace, New York City, the week of December 2 to 7 for the first time since 1940. All available space on four floors will be occupied by exhibits of over 300 manufacturers.

Attendance at these expositions, which are held normally every two years, is restricted to qualified visitors, classified according to buying influence in the field of power production and use. The first Power Show was held in 1922. In charge of the exposition is Charles F. Roth, manager, who will be assisted by E. K. Stevens, associate manager.

Mikolite to Operate Plant in Roundhouse

A new use for a railroad roundhouse was revealed when the Mikolite Co., Inc., of Chicago leased one belonging to the Illinois Central Railroad for a factory. The firm, which makes insulation material from vermiculite mined in Wyoming, will remodel the roundhouse into working quarters at its own expense. Milkolite has leased the building, containing 16,000 square feet of floor space, for a period of five years.

N.I.S.A. Will Intervene In Industrial Sand Case To Fight Rate Increase

Vincent P. Ahearn, executive secretary of the National Industrial Sand Association, in a communication addressed to members, has reported satisfactory progress in the Association's action in making appropriate recommendations to the Interstate Commerce Commission in protest against the carriers' petition for a 40-cent-per-ton freight increase on industrial sand.

Mr. Ahearn and A. Y. Gregory, the Association's vice-president, met in Pittsburgh on May 28, with a representative group of short-haul and long-haul producers and came to the following decisions: that (1) the Association should recommend to the Interstate Commerce Commission that if general increases in freight rates were made, the increase in industrial sand rates should be expressed as a percentage, but with a maximum of 20 cents per ton (the amount proposed for common sand); and that (2) the Association's counsel, William W. Collin, Jr., be instructed to intervene with the Commission.

Members were requested to furnish Mr. Collin with data requested by him to prepare for the case.

Move Grinding Facilities To Forestall City's Suit

After about ten years of litigation, the American Nepheline Corporation will move some of the facilities of its rock-crushing plant from Rochester, N. Y., to Canada. The crushing of coarse rock and grinding operations at the plant, which is situated between an industrial zone and a residential section of Rochester, have been the subject of repeated complaints from the city. The corporation imports rock from the Canadian shore of Lake Ontario and subjects it to processing which reduces it to fine dust.

The city of Rochester obtained a temporary injunction in 1939; but the company installed improved machinery, and the court vacated the injunction. The removal of the coarse grinding operations was decided upon when the city recently sought to bring new action against the company. Other manufacturing operations will be continued at Rochester.

Phosphate Mining Co. Office in Richmond

The Phosphate Mining Co., which operates a phosphate plant at Nichols, Fla., acquired during 1945 by the Virginia-Carolina Chemical Corp., announces the transfer of the company and its personnel to the home office of the parent company in the Richmond Trust Building, Richmond, Va.

Near Henry, Ill., a 160-acre tract of farm land was recently purchased by the Material Service Corp. of Chicago for a washed gravel plant. The farm is the site of an abandoned town, laid out in 1836 as the city of Dorchester.

C.P.A. Reduction Order On Non-Housing Projects Cuts Building Two-Thirds

The Civilian Production Administration cut its rate of authorizations for non-housing construction by roughly $22,000,000 a day in the first ten days following the drastic reduction order of May 29, Administrator John D. Small has revealed.

Construction cost of approvals granted in the period from May 31, to June 10, averaged $7,552,000 a working day. This compared with a rate of $29,110,000 a day from May 10 to 23, which was the base period used when the C.P.A. ordered its field offices to reduce by two-thirds their rate of construction approvals.

Large construction jobs were cut to about one-seventh of the dollar rate during the base period. From a daily average of $6,171,000 during May 10 to 23, approvals by the Facilities Review Committee dropped to an average of $897,000 in the May 31-June 10 period.

The C.P.A. issued its two-thirds reduction order for two reasons: first, because the heavy volume of construction already under way, plus that authorized by C.P.A. and the National Housing Agency, had run ahead of the materials supply; second, because strikes had reduced the output of many building materials.

Privately Financed Building Shows Steadily Rising Curve

Privately financed residential construction (exclusive of farm buildings, trailers, and conversions) was valued at $250,000,000 in April, about 20 per cent. more than the forecast for the month, the Construction Division, Department of Commerce, has announced. The April dollar volume is a 25 per cent. increase over March and a 635 per cent. increase over April, 1945. This upward trend must be maintained in the coming months if 1946 requirements under the Veterans' Emergency Housing Program are to be met, the Construction Division pointed out. The April volume, although encouraging, is still considerably below the monthly average needed to meet this year's requirements.

Privately financed nonresidential building in April was valued at $248,000,000. This was an increase of 7 per cent. from March and of 320 per cent. from April a year ago. Privately financed construction of all types in April totaled $589,000,000, 16 per cent. above the March level and nearly 288 per cent. above that of April, 1945.

Employers Must File to Obtain Price Approval

The National Wage Stabilization Board today announced issuance of its Form 9, to be used hereafter by employers as a notice stating that a wage or salary increase is being made with no present intention of seeking a price adjustment but reserving the employer's right to apply for approval for pricing purposes in the future.

The wage and salary regulations issued by the Office of Economic Stabilization last March 8, provide that an employer who makes a wage adjustment with no present intention of seeking price relief, but who wishes to reserve that right for the future, may do so by filing a notice to that effect with the N.W.S.B., through the local Wage and Hour Offices of the U. S. Department of Labor, within 30 days after the date the increase is first reflected in his current pay roll.

Failure to file such a notice precludes the employer from seeking approval of the N.W.S.B. of the increase for pricing purposes as long as stabilization controls remain in existence. Pending issuance of the new forms, the agency has accepted notices received by letter. Effective May 22, a Form 9 will be required of each employer filing a notice.

6,000,000, Tons of Gypsum In New Certain-teed Quarry

Giant shovels have stripped off more than 50 feet of overburden at the new gypsum quarry opened by the Certain-teed Products Corp. near Fort Dodge, Ia., to expose the 25-foot-thick gypsum deposit. Work is now in progress in the pit, which is expected to be 80 acres in extent, with a total gypsum content of about 6,000,000 tons. The rock is carried to a storage tank at the surface by means of a large pipe, and is later transported by truck to the Certain-teed plant one mile away.

Shippers Board Issues Carloading Forecast

The national forecast of the Regional Shippers Advisory Boards, in a statement covering freight car requirements of 30 principal commodities for the secon quarter of 1946, includes the following predicted figures for four classifications of nonmetallic minerals: gravel, sand and stone—403,710 carloads (379,275 in 1945), an increase of 9.6 per cent. over 1945; salt—34,396 carloads (35,174 in 1945), a decrease of 2.2 percent.; cement—126,969 carloads (101,575 in 1945), an increase of 25 per cent.; lime and plaster—37,033 carloads (33,727 in 1945), an increase of 9.8 per cent. The total United States percentage of decrease for the 30 commodities (from the first quarter of 1945) was 4.2 per cent.

The Ontario Rock Milling Co. of Los Angeles has been sold by Harry Story, who has owned and operated it for a number of years, to Charles Hardy. Mr. Hardy was formerly engaged in the chemical and petroleum fields. The concern will continue to do custom grinding of nonmetallic minerals, and is planning to enlarge the scope of its operations at an early date.

Marquette Spikes Talk of Short Cement Production In Official Statement

In a statement issued on May 29, the Marquette Cement Manufacturing cited figures from the U. S. Bureau of Mines and the U. S. Department of Commerce to demonstrate that there is no shortage of cement at the production source. These figures indicate that present actual productive capacity of the cement industry exceeds all estimated demand by a margin of almost two-to-one. "The most optimistic estimate of consumption calls for about 60 per cent. of the cement industry's capacity," the report stated.

Current talk of cement scarcity, says Marquette, is due to the following causes: unseasonal demands of such proportions that car supply and loading facilities were severely taxed during March and April; an abnormal demand built up by "scare talk" of restrictions on all types of building except veterans' housing; the coal strike, which stimulated a wave of advance buying; and the threat of a railroad strike.

Buffalo Gravel Corp. Buys Pierce-Arrow Plant

The Buffalo Gravel Corporation of Buffalo, N. Y., has purchased a building containing about 40,000 square feet of floor space at the former Pierce-Arrow plant in Buffalo, together with a plot of land on which an office and showroom building will be built.

Carleton J. Lewis, who recently was appointed manager, said that the company's total expenditure for the new building and the purchase of the present structure and land will amount to $200,000. Before assuming duties as manager, Mr. Lewis was secretary and assistant treasurer of Buffalo Gravel for 26 years, positions which he continues to hold.

Remodeling work has been started on the newly-acquired building, which will be used for housing and servicing equipment. The company now has 18 cement mixing trucks and will expand its fleet with 12 more, Mr. Lewis said.

Cavett Builds Bituminous Concrete Hot-Mix Plant

The L. P. Cavett Co. of Lockland, O., is currently erecting a portable bituminous concrete hot-mix plant at North Madison, Ind., where production was scheduled to begin at once. W. W. Stradley, general superintendent, stated that the hot-mix plant will operate at this location until January 1, 1947, and possibly longer.

Producers' ceiling prices increases of 40 cents a ton on Florida pebble phosphate rock and of 20 cents a ton on Tennessee brown phosphate rock were announced by the Office of Price Administration.

WASHINGTON NEWS LETTER

another P&Q exclusive

LAST month this page was devoted to a brief review of the status of the construction program for 1946 and 1947, and it was stated that housing progress had been so favorable that the Wyatt goals could easily be surpassed if non-residential construction were not allowed to get out of hand. Subsequent developments throw additional light on this point.

Perhaps most important is the further curtailment of non-residential construction by the Civilian Production Administration. At the end of March, the C.P.A., after long delay, issued its order, VHP-1, designed to restrict the amount of non-housing construction activity. But by the end of May it was clear that the criteria for approval of such construction had been drawn much too loosely, and that a disproportionate part of total construction resources was being devoted to such work at the expense of the housing program. For example, it had earlier been estimated by a governmental inter-agency committee that more than $5,000,000,000 out of the $9,000,000,000 new construction total in 1946 would be for non-residential building. Of this, $2,100,000,000 was to have been for private non-residential activity; this category is defined as exclusive of farm and public-utilities construction. At the time the order went into effect, about $600,000,000 worth of private non-residential construction had already been put in place, and another $1,500,000,000 worth was scheduled for the remainder of 1946 under contracts already awarded. Thus, the $2,100,000,000 estimate contemplated that the C.P.A. limitation order would be tight enough to screen out all but the merest trickle of really essential non-housing projects. Actually, it appears that the order was applied so liberally that by the end of May the amount of such construction scheduled for 1946 was up to nearly $3,000,000,000—almost 50 per cent. higher than originally estimated.

Largely because of the decentralization of authority, statistical controls over the authorization procedure were slow in coming into play, and the full impact of the growing backlog of non-residential construction was not immediately appreciated. However, the demand for non-residential building showed no signs of let-up, and the competition with the housing program for the same labor and materials supply was too evident to be long ignored. Furthermore, a number of the approved projects were of questionable importance compared to housing. These authorizations were explained as necessary to relieve undue hardships on builders, but the resultant publicity was unfavorable just the same, and generated additional pressure for more severe restrictive action.

The net result was a new and more drastic order by the C.P.A. issued around the first of June, covering the next 45 days as a kind of trial period, during which the field offices were required to slash the weekly rate of authorizations to one-third of the corresponding rate of approvals in May. To accomplish this slow-down, authorizations for new construction were to be restricted to five types of projects only:

1. Projects vitally necessary to public health and safety;
2. Projects to increase production of critical products;
3. Projects essential to increased food production or preservation;
4. Projects to provide minimum community facilities absolutely necessary for new residential areas;
5. Projects to provide urgently-needed veterans' educational facilities.

Exceptions could be granted only in unusual circumstances and then only when "exceedingly severe hardship" could be clearly demonstrated. In every case, it was automatically to be assumed that any construction project would adversely affect housing activity, unless definite proof to the contrary were presented.

This is a tough order, and preliminary returns indicate that it is being applied strictly. But whether the barn door has been shut in time is not yet clear. The total new-construction program for 1946, already quite impressive, has been allowed to increase by more than $1,000,000,000, and the $4,000,000,000 housing program now must compete with $6,000,000,000 of total non-residential activity. Furthermore, the 45-day order comes up for review in mid-July, when a decision is to be made whether or not to extend it.

Even if the slowed rate of authorizations is maintained, another $500,000,000 or so will have been added to the 1946 new-construction program by the end of the year, bringing the non-residential segment alone to $6,500,000,000. It will be recalled that not long ago it was expected that the total new-construction program—residential and non-residential together—would be no higher than this.

The implications of the volume of non-residential building activity for the housing program are to a large extent self-evident. But the relationship was given pointed emphasis by the National Housing Administration action which accompanied the tightened C.P.A. order. Up to the end of May, HH priorities had been issued for about 530,000 conventional dwellings; in addition, about 70,000 had been started before such priorities were required, so that the total number of units authorized or started in the first five months was roughly 600,000. As the N.H.A. appraised the situation, this was considered excessive in view of the prospective supply of materials and labor. Conventional starts in May continued at the 65,000 rate set in April, and in many areas the two-month total was considerably above the goals set for the second quarter as a whole. Consequently, housing authorizations were sharply curtailed in June, averaging not much more than 12,500 weekly as against 30,000 a week in April and May. Thus, the increasing consumption of available building resources by the non-residential program has had a very direct effect on the timing as well as the volume of housing construction. As indicated above, the problem will be even more difficult in the months ahead. Of course, some types of non-residential construction are as important as housing. But too much of lesser importance has already been authorized, and no practical means of retracing our steps has been proposed.

Portable aggregate plants are here to stay. If you are interested, the Pit and Quarry Handbook will tell you all about them.

New Plants and Improvements Serve To Relieve Shortages in Phoenix Area

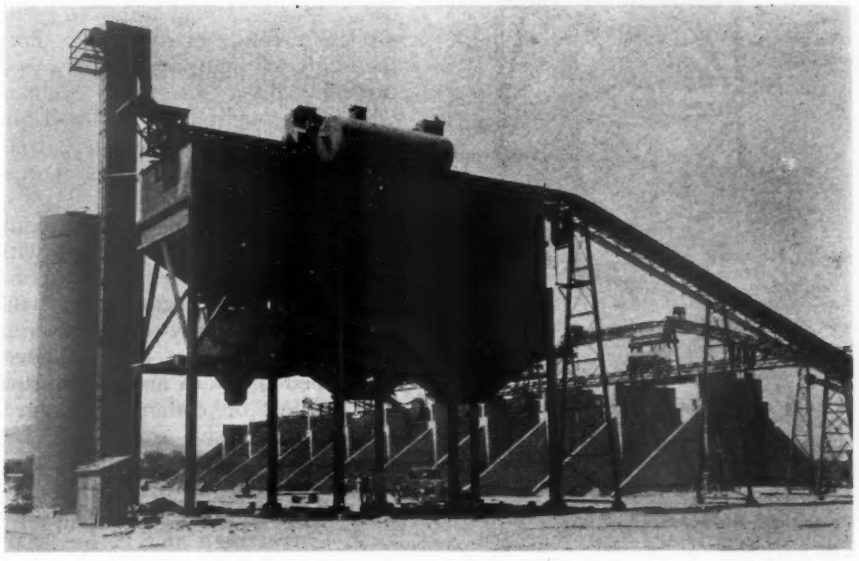
another ON THE SPOT report

PHOENIX, Arizona, has been bursting at the seams as far as population is concerned ever since Pearl Harbor. The end of hostilities has had little effect on lowering the number of families who are clamoring for housing and the latest

By HARRY F. UTLEY

estimate shows that twice as many persons are living in the metropolitan area than was the case five years ago. An unprecedented amount of housing is under construction and this condition is likely to continue for years to come. Industrial and commercial construction is likewise booming and will leap forward once building restrictions are removed or relaxed.

In anticipation of this continued growth, Phoenix aggregates and concrete producers are speeding to completion new production facilities to supply this demand. Some of the important developments are described and illustrated here.



A view of the Fisher Contracting Co., near Phoenix, Arizona, showing the batch plant and two truck-loading bins. The silo is for bulk cement.

Fisher Contracting Company

Late this summer, production is scheduled to begin at the new and ultra-modern sand-and-gravel plant now nearing completion at Phoenix by the Fisher Contracting Company. Its initial rated capacity will be about 200 tons per hour but this can be doubled later on if the demand warrants by installing wider conveyor belts.

A feature of the Fisher plant will be its remote, automatic control, 10 or 12 Jeffrey-Traylor electric vibrating feeders being installed at the various loading points and in the reclaiming tunnel beneath the live-storage piles. All screening will be done by Symons vibrating units arranged in line along the trestle above the storage. Three sand drags, designed and built by the company, will make and classify the sand.

A 10- by 36-inch Cedar Rapids jaw crusher will accomplish the primary breakage and secondary reduction is to be handled by a Symons 4-foot cone crusher.

At the same time, a new batching plant is being built to serve the company's truck mixers. The batch plant, equipped with a C. S. Johnson weigh-batcher and bulk-cement silo, is alongside the two truck-loading bins where the finished aggregates will be loaded out. Each of the three steel bins has four compartments, enabling the concern to load any one of eight sizes of material, including sand, into delivery trucks, or a blended mixture of any composition if desired. The four compartments in the ready-mix plant bin will allow the batching of a wide range of specification materials. An inclined belt-conveyor, at right angles to the reclaiming belt in the tunnel under the storage piles, will keep the bins filled.

The plant is entirely of steel and concrete construction and is located in the dry bed of the Salt River. Although an excellent source of gravel at many points, the river bed is notoriously deficient in fines. At the deposit where the Fisher plant is being erected, however, there is a high percentage of sand and good gravel.

American Rubber belting is being used on the conveyors. A Howe scale of the latest type is being installed in the scalehouse.

Although the plant is the first commercial venture of its type for the Fisher Contracting Company in Phoenix, the owners, John and Del Fisher, formerly operated a portable plant at Prescott, Arizona, and for a few years owned and operated the old Ward Sand & Gravel Company plant at Oxford, Michigan.

A general view of the Fisher plant as it neared completion. At right, the batching plant for ready-mixed concrete and two truck-loading bins. The bins are fed by the conveyor leading up to them, which in turn is fed from a reclaiming tunnel beneath the storage piles.

Later on the company expects to utilize a sizable portion of its output by installing an asphalt plant, a concrete-block plant, and a concrete-pipe plant adjoining the aggregates operation.

A cone crusher on the ground level will be fed by the electric vibrating feeder beneath the cylindrical surge bin. Pump for wash water in foreground.

Arizona Sand & Rock Co.

Another important development in Phoenix is the new central-mixing plant soon to be placed in service by the Arizona Sand & Rock Company. Rising 110 feet into the air, the all-steel structure is visible for miles as one approaches Phoenix from the south. It is expected that the new plant will be functioning by late summer or early fall.

The company operates an imposing fleet of Jaeger, Rex, and Smith truck-mixers, 13 of the units having 4-cubic-yard mixers, two have 3-cubic-yard mixers, and one is a 2-cubic-yard model. This fleet has been served for several years by a straight batch plant consisting of Butler bins and Hardy scales and weigh-batching equipment. In the interest of improved quality and better control of the concrete, as well as full utilization of the capacity of the mixing drums on the trucks, the new plant will pre-mix the concrete, the delivery fleet serving as agitators. It is expected that air-entraining cement will be available in the area within a short time and the concern may deliver some of its output in dump trucks in line with the trend that has been noted in the East in the last few years.

The new plant consists of a C. S. Johnson Octobin structure, its eight bin compartments having a total storage capacity for aggregates of 2,000 tons. Hardy equipment will be used to proportion the ingredients and two Koehring 4½-cubic-yard drum-type mixers will mix the concrete. The company is reportedly working out a method of continuous slump determination for careful control of the concrete. A special 135-foot boom was built by plant mechanics for use on one of the concern's Marion Diesel cranes to facilitate the erection of the plant. Both the old batch plant and the new central-mix plant use bulk cement which is brought in by railroad and delivered to the plant by trucks from a transfer plant located about one-half mile distant.

The company's aggregate plant, which has been in operation with benefit of periodic improvements for about 20 years, is located across the road from the ready-mixed-concrete operations. As part of the above-mentioned program and to improve the loading of commercial aggregates, an extensive stockpiling and recovery system is also under construction. This consists of a huge reinforced-concrete tunnel 525 feet long, 12 feet high and 16 feet wide for reclaiming the finished materials which will be stored above. A shuttle conveyer operating in a trestle will stockpile the various-sized gravels and sand over the tunnel. A belt-conveyor running along one side of the tunnel will extend under the road and up to the top of the new central-mix plant to load the bins. This leaves sufficient room for the delivery trucks to drive through the tunnel and load from gates in the roof.

There will be 24 gates in all—12 to feed the conveyor leading to the concrete plant, and 12 to load the trucks. These will be air-operated and electrically-controlled, the controls for the gates over the belt being operated from the concrete plant; those for the truck-loading gates will be pendent push-buttons operated individually at each gate by the truck drivers.

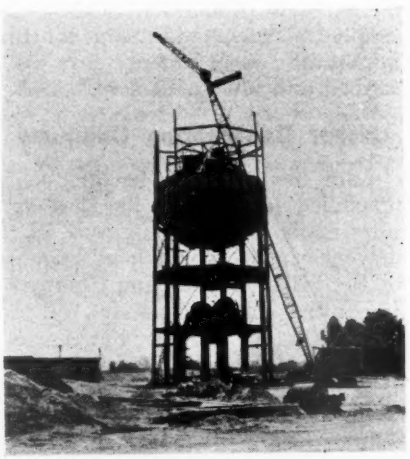
The aggregates plant has a producing capacity of from 1,500 to 2,000 tons per day. Up to 40 per cent. of the output goes out in the form of ready-mixed concrete.

D. W. Kelley is president of the Arizona Sand & Rock Company. Al Carter is general superintendent.

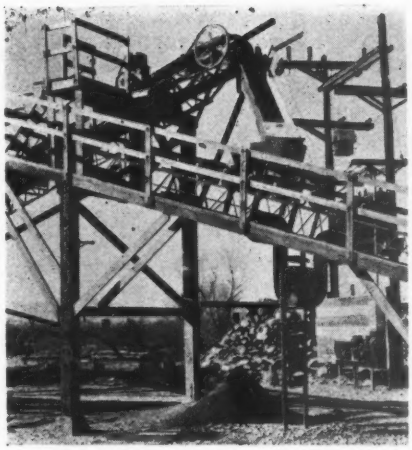
Union Rock & Raw-Material

An older plant which had been producing sand and gravel in the Salt River since 1929 for the Union Rock & Materials Company was torn down last year and a new operation erected on the identical site over a 90-day period. This plant, which began producing in October, 1945, has a capacity of more than 300 cubic yards per 8-hour day, up to half the output being utilized on the premises in the production of concrete products and ready-mixed mortar.

(*Continued on page* 146)

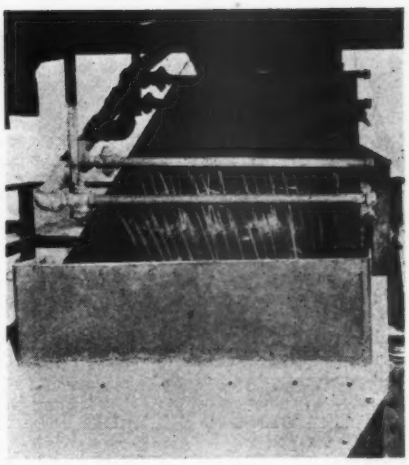


Right: The new central-mixing plant at the Arizona Sand & Rock Co., while under construction, showing the octagonal bin for aggregates and cement. Below: View inside the reclaiming tunnel beneath stock piles. Conveyor will operate close to right wall.



The 16-inch by 80-foot return conveyor, which carries material to the main belt from the cone crusher at the Union Rock & Materials Co. plant near Phoenix.

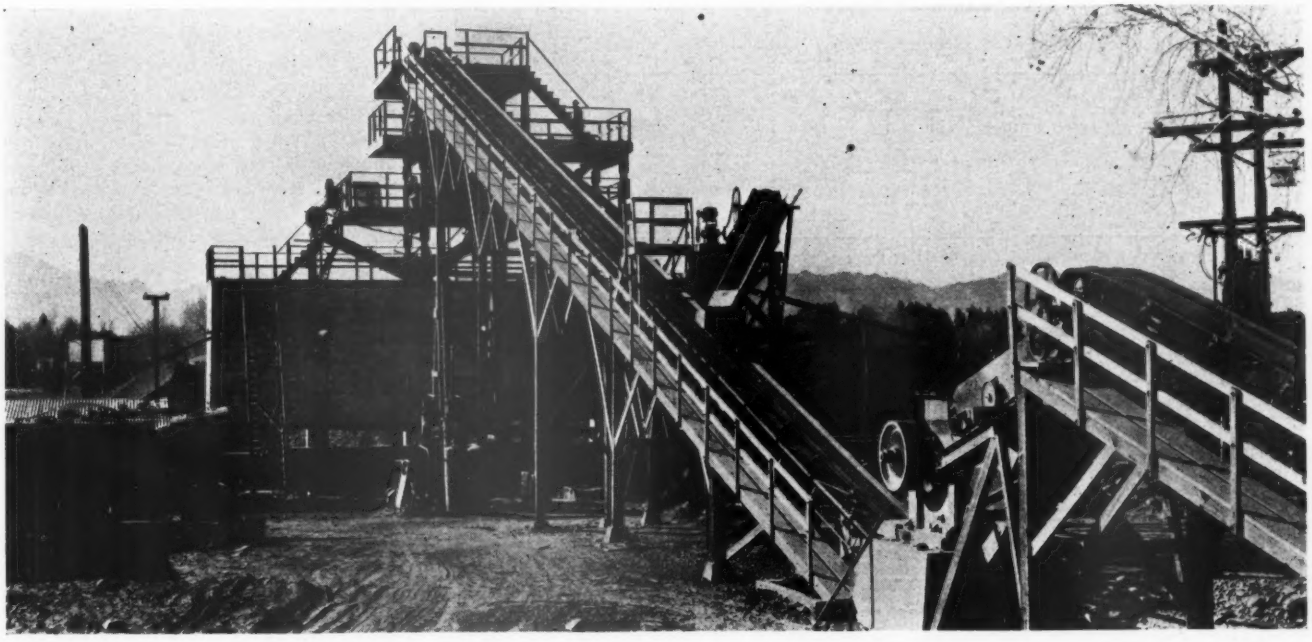
The main conveyor to the plant and (lower right) the secondary crusher with feed chute and return conveyor.



One of the two 3- by 8-foot double-deck sizing and washing screens. Rejects from the 1-inch mesh are chuted to the ground level for further reduction.

The ready-mixed lime-mortar plant, where lime putty is aged in open vats beside the plaster-sand bins.

Three vibration-type block machines turn out 16-inch units resembling the native adobe blocks.



A view of the plant from the primary-crusher end, looking toward the secondary crusher. This plant, in operation since 1929, was torn down and rebuilt last year within 90 days.

New Outlets for the Lime Industry- An Analysis of the Uses of Lime Part II

By WOLF G. BAUER
Consulting Engineer

CAUSTICIZER (L)

Definition: A substance which reacts with a light metal to form the hydroxide.

Used in: Causticizing agent in making caustic soda and potash; as in making rag, soda process, and sulphite process paper; manufacture of synthetic phenol from benzene; alumina from bauxite.

CEMENT (D, LS, L, DL)

Definition: A plastic material which hardens and forms a firm connecting medium between two solids.

Used in: Cementing agent in paints; formation of mono-calcium silicate cement in sand-lime brick; carbonate cement in aged mortar; in water lime paints; in Portland, sorel, and masonry cements.

CLEANSER (LS, D, L)

Used in: Soap making; whiting in cleansing preparation.

COAGULATOR (L)

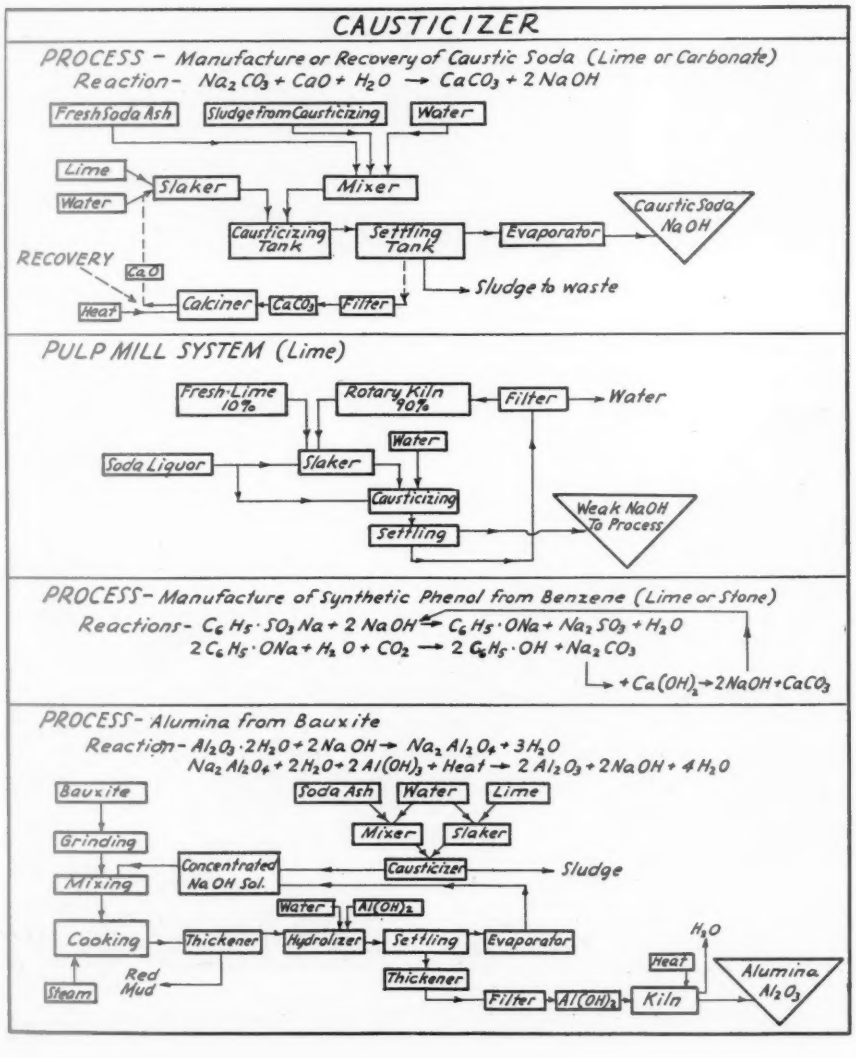
Definition: An agent to precipitate colloidal masses by clotting together or curdling.

Used in: Clarification of turbid water for ice making; impurities in sorghum juice; fibers in pulp from starch manufacture; oily ore slimes prior to cyaniding; alone or with ferric chloride to settle industrial effluents such as from dye works, pulp mills, tanneries, dairies, canneries, starch plants, breweries, water and sewage-treating plants.

COATER (L)

Definition: A substance which covers with a protective coat.

Used in: On iron kiers to prevent staining of textiles; inside surfaces of kilns in the malting industry; cold water paints and white washes and sprays; electric arc welding electrodes.



CONTROLLER (LS, D, DL, L)

Definition: A substance allowing changes to be made in the chemical balance of other substances, in this case the pH of solutions.

Used in: Processing of chemical liquors; solidification temperatures in Glyptal resins; acidity control of calcium sulphide solutions; regulant for plant diseases; weeds and mosses in pastures; sheep dips for pest control; regulation of carbon dioxide and bulking in activated sludge process for sewage.

DEHYDRATOR (L, LS)

Definition: A water or moisture-removing agent.

Used in: Conditioning of air and gases; greases; petroleum; manufacture of rubber; commercial alcohol; making of acetone from sodium acetate; to inhibit caking of table salt.

DEODORANT (L)

Definition: An agent which removes, corrects, or represses undesirable odors.

Used in: Deodorizing vegetable oils; stables and barns; water and sewage.

DEPILATORY (L)

Definition: Reagent which removes hair from hides and skins.

Used in: Leather manufacture for dehairing hides.

DESULPHURIZER (L)

Definition: Sulphur removing agent through absorption, adsorption, neutralization.

Used in: Refining of petroleum.

DIGESTER (DL, L)

Definition: Disintegrating agent.

Used in: Pulp; strawboard; bagasse; corncobs; hulls; news print; cotton linters; flesh of animals.

DISINFECTANT (L)

Definition: A substance which destroys micro-organisms.

Used in: Purification of water containing high coli-B content; general disinfecting measures for barns, cess-pools, chicken coops, drains, outhouses, stables; plumping of hides for germicidal action.

EXTENDER (D, LS)

Definition: A material, usually inert, which tends to increase volume and surface of another substance to which it is added.

Used in: Paints, washes, lacquers.

FILLER (L, DL, LS, D)

Definitions: A material tending to fill pores, increase density, and modify physical properties of substances.

Used in: Fertilizers; leather manufacture; linoleum; oil cloth; with alum in paper; window shades; general loading of paper and cardboard; soaps; sizes for ropes and twine; dressing of textiles; glazier's putty; rubber goods; phonograph records; plastics; fabrics; asphalt and bituminous pavings; crayons and pencils.

FLOCCULATOR (L, DL)

Definition: An agent for coagulating finely-dispersed precipitates.

Used in: Settling of ore slimes in refining gold, silver; flocculation of clays for filtering in rubber manufacture; precipitating colloidal matter in soils; granulation of soil base for road beds; flocculation of latex in rubber industry.

FLUX (L, LS, D, DL)

Definition: An agent promoting melting of substances by dissolving their surfaces and combining to form compounds of lower melting points.

Used in: Manufacture of soda-lime glass and other glasses; melting and slag-promoting agent in basic open-hearth steel, copper and lead smelting to form calcium silicates for silica removal; smelting and refining of nickel and tin ores; puddling furnaces; ceramic and pottery clay bodies and glazes; manufacture of mineral wool.

FUNGICIDE (L)

Definition: An agent that destroys fungi and spores.

Used in: Soils to prevent plant diseases; Bordeaux mixtures to inhibit damaging action of metal salts like copper on plants; also as a spreader and extender for fungicide sprays.

GAS SOURCE (D, LS)

Used in: Industries using carbon dioxide gas, liquid or solid, such as fire extinguishers for fires caused by inflammable liquids and vapors; manufacture of precipitated carbonates; respiratory, stimulation; cleaning of water wells; alkali manufacture; hardening of steel; carbonation of beverages; wine; water; tobacco; textiles; sugar; soap; rubber; waxes and resins; refrigeration; plastics; pharmaceutical; petroleum; perfume; varnishes and paints; mining; construction-material testing; curing; explosive mixture grinding; leather; insecticides; adhesives; fuels; foods; explosives; electrical; dyes; plumbing; chemical as in white lead, salicylic acid; brewing; agriculture; motors; analytical work; abrasives; shrink-fitting machine parts; hardening.

HYDROLIZER (L)

Definition: Promoter or catalyst to facilitate a decomposition reaction by water. Reverse action of neutralization.

Used in: Manufacture of benzoic acid; production of B-hydroxyanthraquinone; ammonia-soda process, chlorine and sulphonated napthalene derivatives; glue for use in pre-vulcanizing of rubber.

INHIBITOR (LS, L, G)

Definition: A substance which arrests or stops a chemical reaction.

Used in: Prevention of explosions in coal mines; grinding of sulphur and other combustible substances; control heat of combustion in cigarette paper; pests.

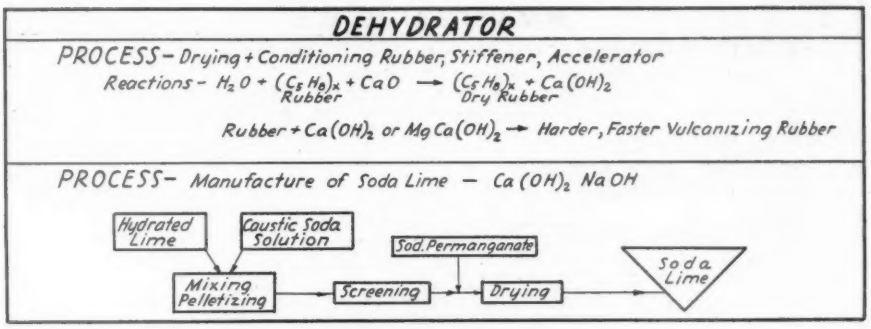
LUBRICANT (L, DL)

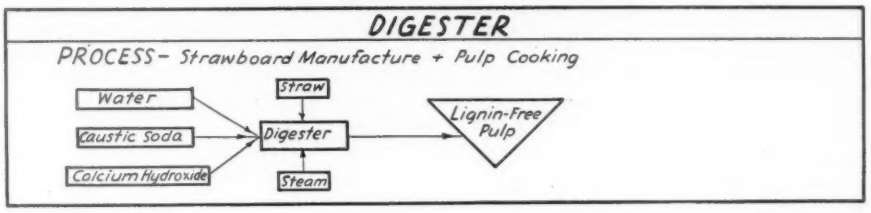
Used in: Indirectly as lime soap in greases and heavy oils; for lubricating dies in wire drawing; in increasing the workability of concrete and mortars during wet mixing.

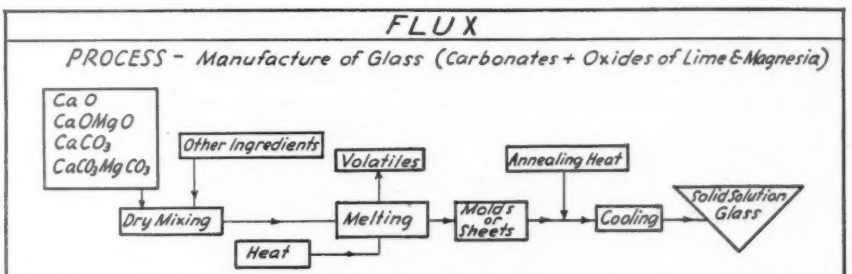
MEDICANT (L, DL)

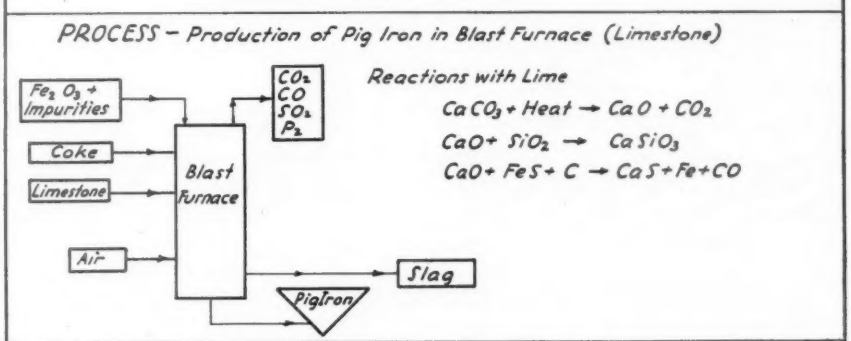
Definition: Corrective agent for body disturbances (livestock, in this case).

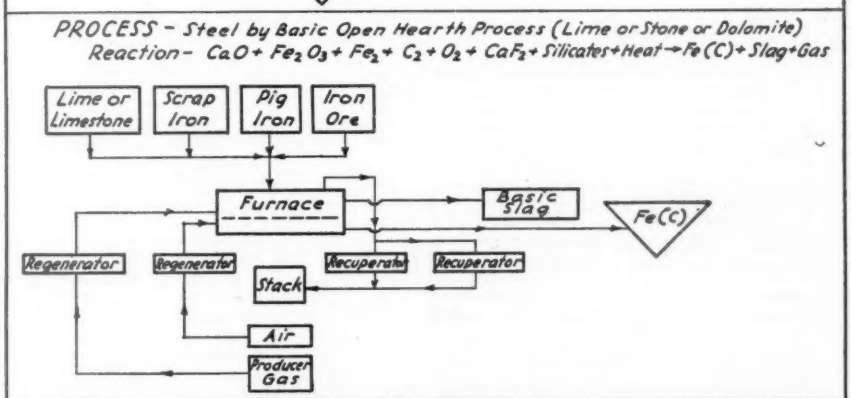
Used in: Treatment for livestock ailments as conditioning tonic; combating

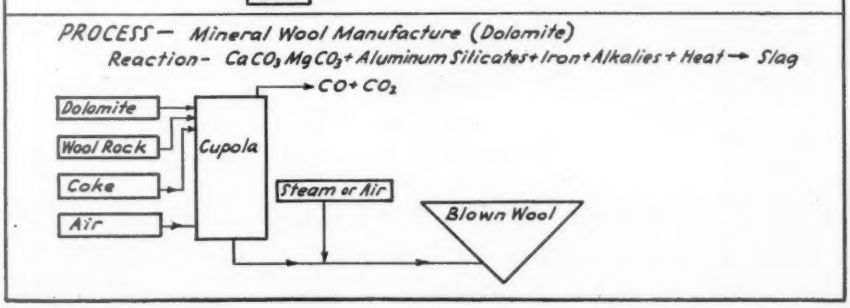


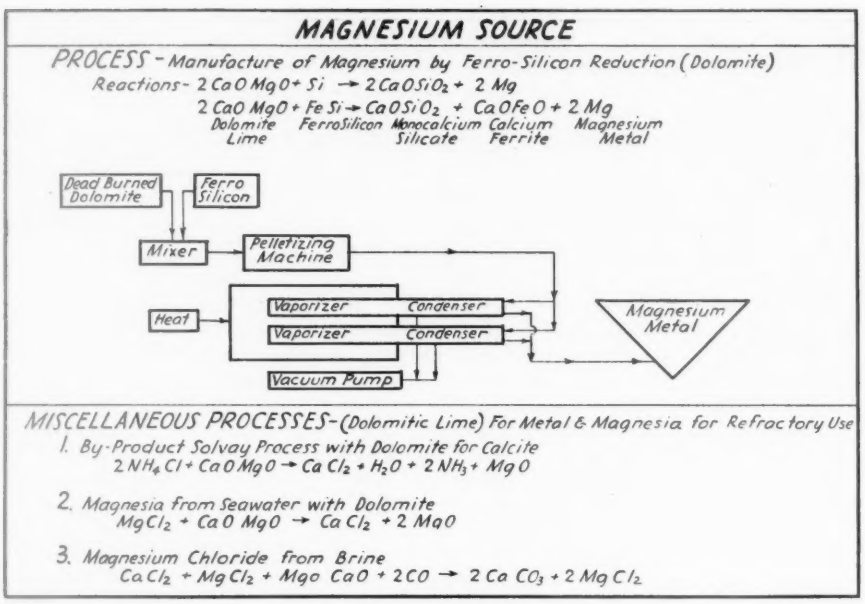


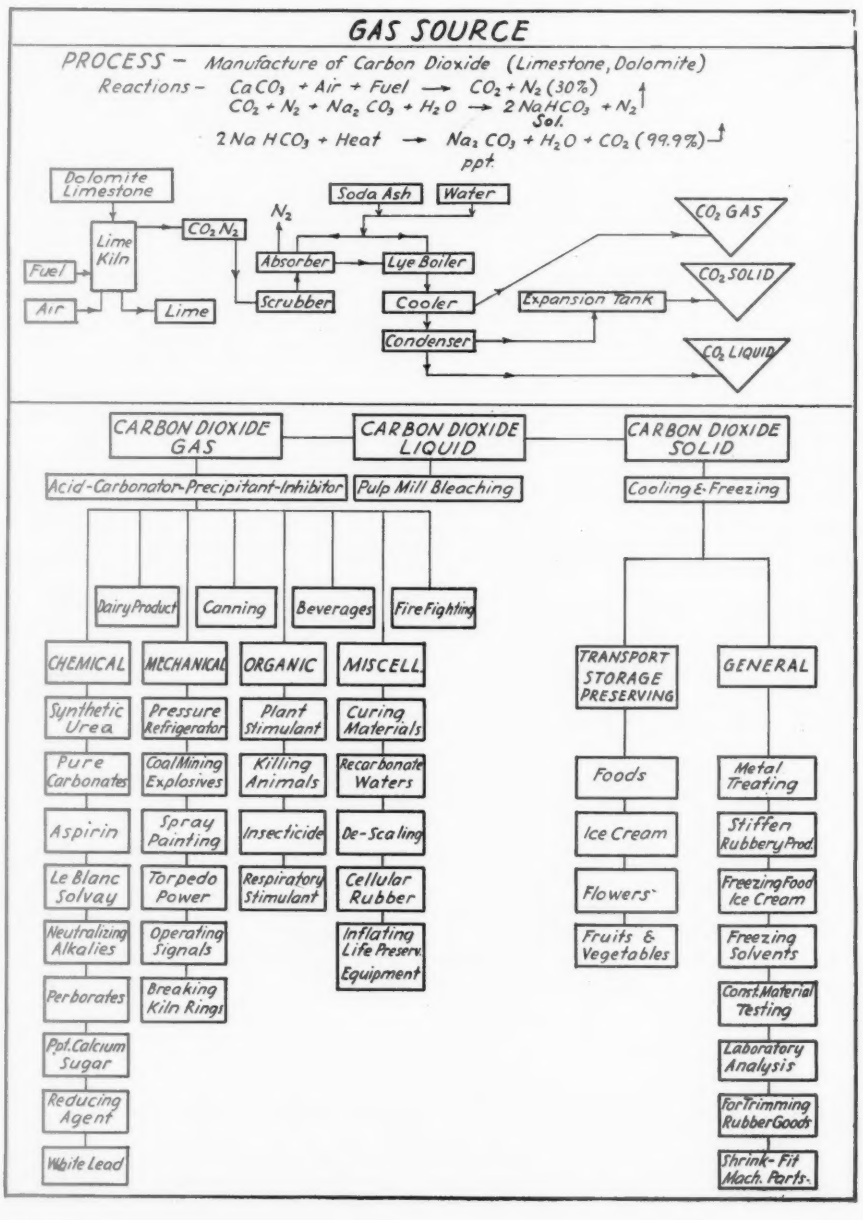









MAGNESIUM SOURCE
PROCESS - Manufacture of Magnesium by Ferro-Silicon Reduction (Dolomite)
Reactions - 2 CaO MgO + Si → 2 CaO SiO2 + 2 Mg
2 CaO MgO + Fe Si → CaO SiO2 + CaO FeO + 2 Mg
Dolomite Lime
FerroSilicon
Monocalcium Silicate
Calcium Ferrite
Magnesium Metal
Dead Burned Dolomite
Ferro Silicon
Mixer
Pelletizing Machine
Heat
Vaporizer
Condenser
Vaporizer
Condenser
Magnesium Metal
Vacuum Pump
MISCELLANEOUS PROCESSES - (Dolomitic Lime) For Metal & Magnesia for Refractory Use
1. By-Product Solvay Process with Dolomite for Calcite
2 NH4 Cl + CaO MgO → Ca Cl2 + H2O + 2 NH3 + MgO
2. Magnesia from Seawater with Dolomite
Mg Cl2 + CaO MgO → Ca Cl2 + 2 MgO
3. Magnesium Chloride from Brine
Ca Cl2 + Mg Cl2 + MgO CaO + 2 CO → 2 Ca CO3 + 2 Mg Cl2



of tuberculosis; abortion; controller of metabolism.

OXIDIZER (L)

Definition: A substance which increases the valence of an ion or atom, usually promoting combination of oxygen with a substance.

Used in: Oxidation of carbon to monoxide in carbide manufacture; indirectly in producing calcium silicide; decolorizing carbon from sulphite waste liquors.

PHARMACEUTICAL (L, LS)

Used in: Lime water; calcium sulphonate; calcium lactate; calcium tannate; carron oil; lime syrup; base for salves.

PIGMENT (L, LS)

Definition: A finely-divided, insoluble, colored substance.

Used in: Kalsomines and water paints; paints; concrete and artificial masonry; indirectly in satin white; leather finishing; paper and plastics; rubber; plaster or stucco sands.

PLASTICIZER (L, DL)

Definition: A substance which keeps material or compounds soft and viscous.

Used in: Mortars; plasters; cements and concrete; artificial stone mixes.

(To be concluded)

18 States Fight Illegal Highway Fund Diversion

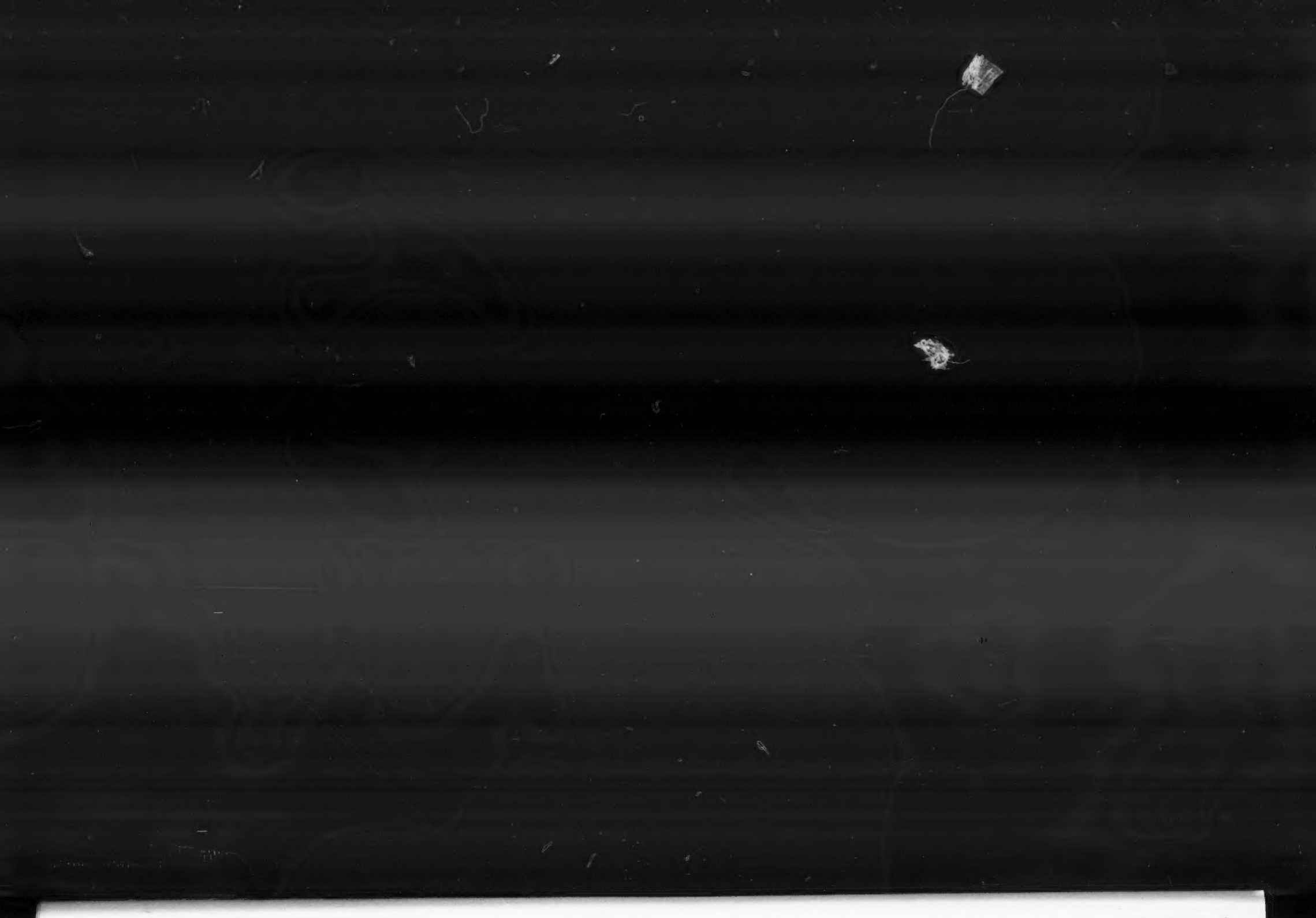
Efforts to curb highway fund diversion have been pressed in a number of states 1946 legislatures, while plans for 1947 legislative action already are being mapped in others. State constitutional amendments to prohibit the use of highway-user taxes for non-highway purposes have been proposed in a number of states, including Massachusetts, Mississippi, New Jersey, New York and Rhode Island.

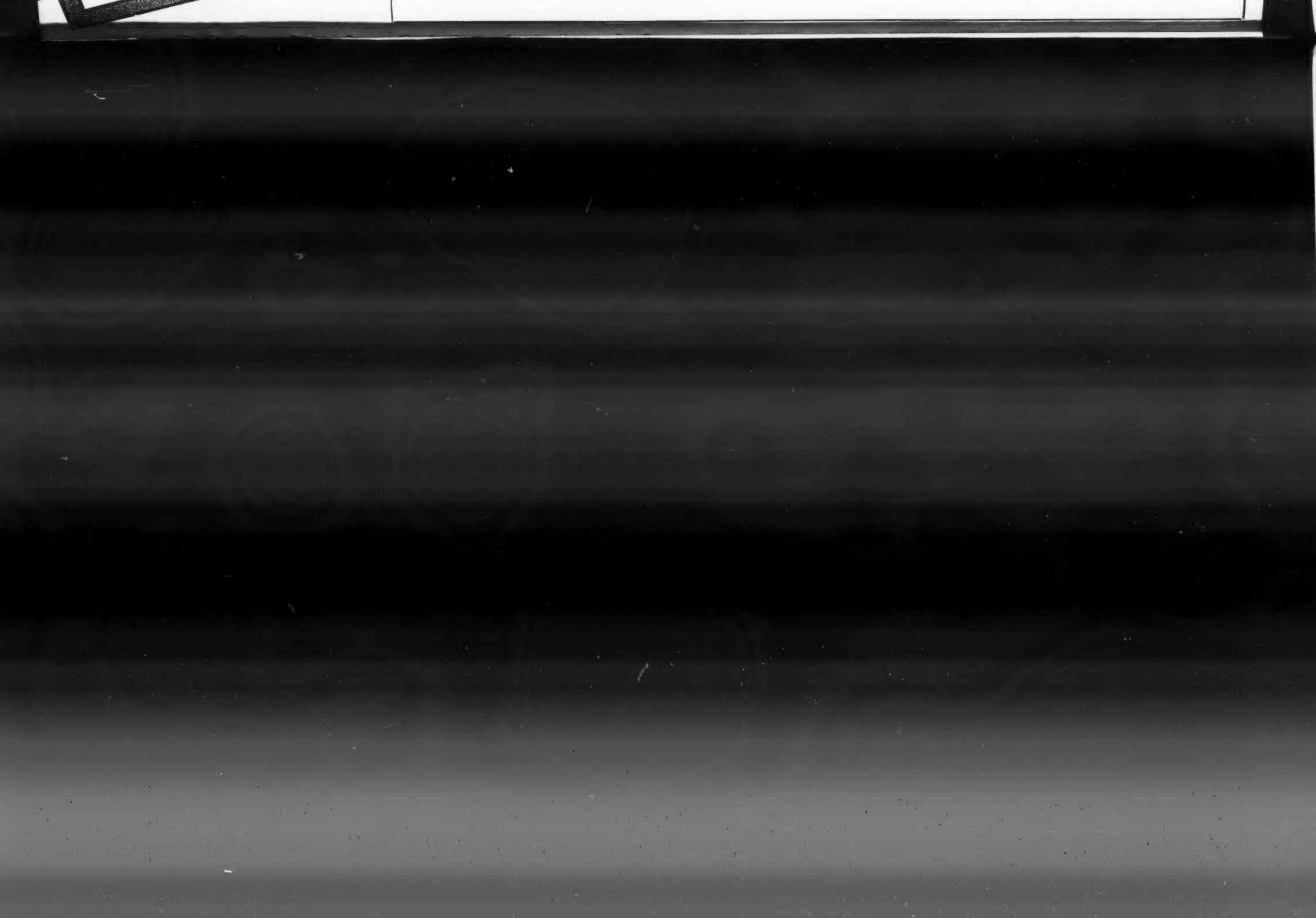
Kentucky and Pennsylvania last year adopted such amendments, bringing to 18 the number of states which now constitutionally restrict the use of automotive tax revenues to highway purposes. The other states which have taken such action are California, Colorado, Idaho, Iowa, Kansas, Maine, Michigan, Minnesota, Missouri, Nevada, New Hampshire, North Dakota, Oregon, South Dakota, Washington and West Virginia.

The legislatures of Indiana and Tennessee last year approved anti-diversion amendments, but in both states favorable action must again be taken by 1947 legislature before the issue goes to the voters. As a result of 1945 legislative action, such an amendment will be submitted to Texas voters at the general election this year.

Recommended state budgets in both New Jersey and New York contained provisions for continued heavy diversions of automotive tax receipts to general purposes. In both states, as in a number of others, the general use of gasoline tax receipts has virtually become a fixed part of their fiscal structures..

In New Jersey, the joint state legislative appropriations committee was warned by State Highway Commissioner Spencer Miller, Jr., that the state faces a penalty of a $2,428,000 deduction in federal road aid unless its highway fund diversions are halted during the 1946-47 fiscal year.





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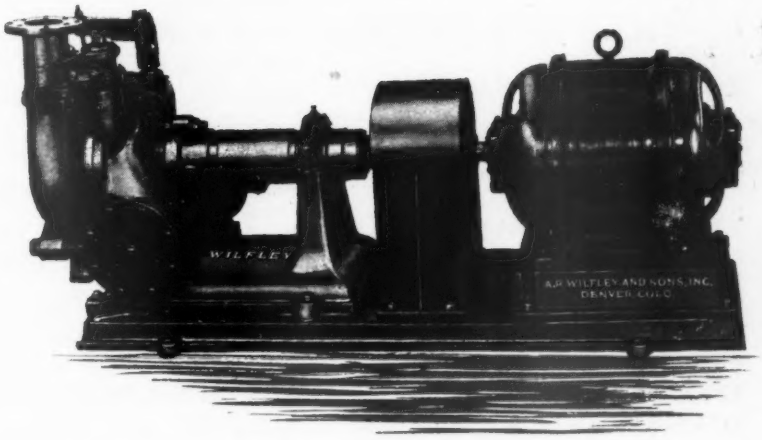

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F. L. SMIDTH & CO. Manufacture the Following Complete Line of Modern Machinery for Cement, Lime and Allied Materials, the Sintering of Ores, etc.

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UNIKOM multi-compartment grinding mill.
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EXTRACTORS, cement from silos.
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PNEUMATIC FEEDERS.
SLURRY FEEDERS for kilns and mills.
CRADLE FEEDERS for coal, rock, clinker.
TABLE FEEDERS for coal, rock, clinker.
COAL FEEDERS for rotary kilns.
COAL BURNERS for rotary kilns.
GAS BURNERS for rotary kilns.
OIL BURNING EQUIPMENT for kilns.
SYMETRO Drive, speed reduction units.
PUMPS for heavy liquids as cement slurry.
FLOURMETER for determining micron sizes in finely ground cement, etc.

F. L. SMIDTH & CO., incorporated in the United States in 1895, are engineer specialists in the design and manufacture of calcining and grinding machinery used for cement, lime, ores, etc.

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While the grinding mills have long been used in many industries, the rotary kiln was formerly used principally in the cement industry, but the specially designed Smidth kilns, due to their high efficiency, are now also playing an important part in the making of magnesium, manganese, aluminum, dolomite, alkali, nickel, lime, iron, tin, etc.

Smidth machinery has been supplied to about 70 different countries of the world, numbering thousands of machines.

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11 WEST 42ND STREET ENGINEERS NEW YORK, N. Y.

First Panama Cement Plant to Be Ultramodern in Design

By E. H. BAXA
Engineer, Pyro Processing Section
Allis-Chalmers Manufacturing Co.

another PQ exclusive

PANAMA, the best known of the Central American countries, has previously depended entirely upon cement imported from the United States, South America, and Europe to supply its demands. Under normal conditions this supply was quite reliable and in some cases cheap. It was, however, found that at times when cement and its products were most needed they were either hard to obtain or were expensive.

As early as 1939, the effects of the impending war were becoming evident, and a group of public-spirited citizens under the leadership of former President, R. A. de la Guardia began investigations to determine the feasibility of a cement plant in Panama. Under the sponsorship of this group, and with the aid of Dr. Thomas F. Thompson, Chief of the Geological Section of the Canal Zone Special Engineering Division, two possible sources of materials suitable for the manufacture of cement were located. Both of the deposits located were along the Boyd-Roosevelt highway, connecting Panama City and Colon, approximately midway between the centers of consumption.

The core drilling of the deposits indicated that one of the locations would be less desirable because of the fact that the quarry would not be self draining. In a climate where the average rainfall is approximately 180 inches per year, this would involve considerable pumping. The other deposit (known as the Quebrancha because of its proximity to the Quebrancha River) was more thoroughly explored and finally selected. The explored portion of this deposit contains sufficient material for approximately 50 years of operation, and superficial examinations indicate that almost unlimited quantities of materials lie in the unexplored reserves.

When the ample supply of raw materials was apparent, the preliminary group of sponsors was organized into a stock company bearing the name of Cemento Panama with Dr. Agusto Boyd (former President of Panama) as president.

A contract covering the main processing equipment, power plant, and layout engineering was awarded to Allis-Chalmers early in 1944, but because of priority regulations in effect at the time, actual work on the project was not started until early in 1945, when priorities were granted.

The plant site selected is on the bank of the Quebrancha River, approximately 400 feet from the quarry and a similar distance from the Boyd-Roosevelt highway. Since there is no town or city near by, Cemento Panama will construct a modern village within walking distance from the plant for the use of plant employees. This village consists of 17 houses for two families each, to be occupied by different types of foremen. Eight one-family dwellings will be occupied by the leading foremen and assistants to the superintendent, while two houses with ten rooms each will be occupied by bachelors.

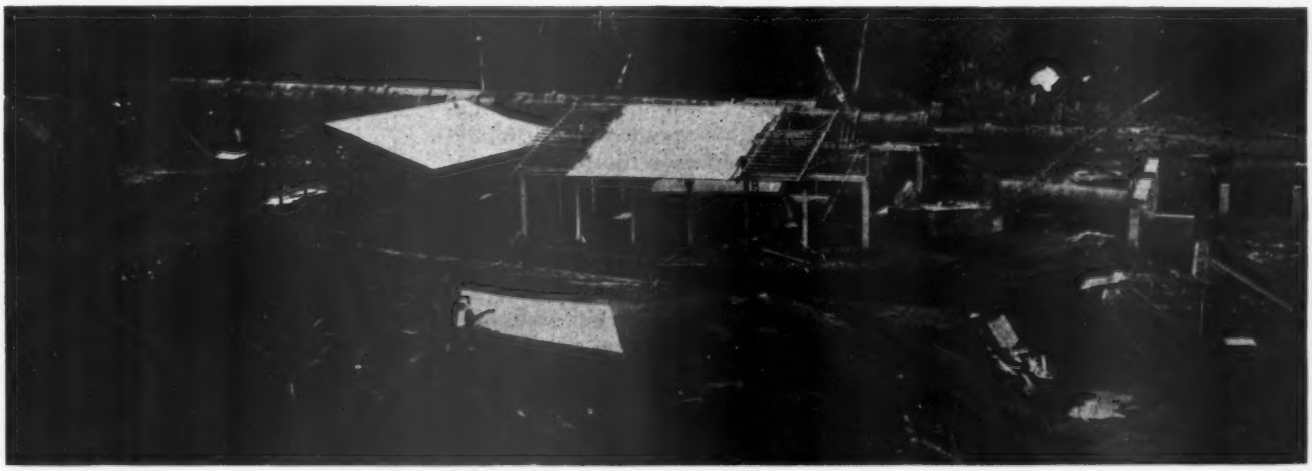
Raw Materials The raw materials for the production of cement will consist of limestone and calcareous siltstone, both of which are found in the same deposit. The limestone appears in thick beds consisting mainly of ancient marine shells which are firmly cemented together with a mixture of silt and secondary calcium carbonate. The limestone strata dip at approximately 30 degrees.

The calcareous siltstone, which is a mixture of fine silt loosely cemented together with secondary calcium carbonate, overlays the limestone conformably. Roughly three parts of limestone and one part of siltstone will be required to make the raw mix.

The quarry will be opened with a face at right angles to the strike of the strata. Working the deposit in this manner will permit quarrying material which is predominately siltstone at one end of the face and limestone at the other. Only small quantities of siltstone will have to be stripped from the limestone in the central section of the quarry face. This method will permit gaining and handling both materials with the same equipment.

The quarry face will be approximately 75 feet high, and the materials will be loosened by well drill—dynamite method. Some secondary blasting is expected.

The quarry floor will be at an elevation of approximately 90 meters and will slope gently away from the face. The materials will be loaded with a Diesel-powered 1½-cu.-yd. Koehring shovel and hauled to the crushing plant, approximately 800 feet distant, by semi-trailer trucks.



Cemento Panama's cement plant on the Quebrancha River in the early stages of construction.

Left: Material will be reduced to minus 5-inch size by this primary jaw crusher. Right: The 300-foot kilns have an 8½- by 25-foot burning zone.

Raw-Materials Crushing

General Design In order to reduce effectively the large quarry raw material (resulting from the methods of quarrying and the use of mechanical handling equipment) to minus ¾-inch with a maximum of fines, two stages of crushing will be used. Because the quarry floor will be from 20 to 25 meters higher than the main part of the plant, and a large portion of this difference in elevations appears in the form of a rather steep hill, it was possible to arrange the crushing equipment so that the materials flow by gravity through the entire crushing process.

Primary Feeder The crushing plant feed hopper was placed at approximately the same elevation as the quarry floor in order that the motor truck haulage from the quarry might operate on level roads. This hopper will have a capacity of approximately 30 metric tons of quarry-run stone and will be arranged to accommodate either side- or end-dump trucks.

The material will be withdrawn from the feed hopper by an Amsco, 48-in. by 16-ft. heavy duty, manganese-steel apron feeder. This feeder will be driven by a 5-hp. four-speed induction motor to give the operator good control of the feed rate to the primary crusher.

Primary Crusher The quarry-size material discharged from the primary feeder will be reduced to minus 5 in. in a 42-in. by 40-in. Allis-Chalmers Superior Blake-type jaw crusher. Although this unit has a capacity considerably in excess of that necessary to permit supplying the plant needs in 40 hours per week, it was selected because of its ability to handle large pieces and thereby eliminate the necessity for excessive secondary blasting in the quarry.

Secondary Feeder The product of the primary crusher will discharge directly into a surge hopper having a capacity of approximately 10 metric tons. The material will be withdrawn from the surge hopper by an Amsco 42-in. by 22-in. medium-duty pan-type feeder and delivered to the hammermill for further reduction. The purpose of this surge bin and secondary feeder is to level out the irregularities in discharge from the primary crusher (which may vary from zero to 150 tons per hour) to an average rate sufficient to keep the secondary crusher working at or near its maximum capacity. The feed rate can be varied either by using any speed of a four-speed driving motor, or setting the hammer-type regulating gear.

Secondary Crusher Because of the marine origin of the calcareous material and the fine stratification of the argillaceous component, both of which have a rather well defined and fine natural particle size, they are ideally suited to reduction in a hammermill. Because seasonal rains lasting for months occur at the plant site make it necessary to crush materials saturated with water, a Dixie No. 3640, non-clog hammermill was selected as the secondary crusher. This unit employs a traveling breaker plate which tends to prevent the most critical internal parts of the crusher from being immobilized by an accumulation of the sticky portions of the material being crushed.

Conveyor to Storage The hammermill product will be deposited onto a 24-inch belt conveyor running at an inclination of approximately 12 degrees to a point on the storage yard wall just below the crane runway rail, then extending horizontally for approximately 290 feet and terminating at the draw mill feed bins. The horizontal section of this conveyor is equipped with a hand-operated, power-driven tripper which will permit the crushing plant product to be discharged into any of the three raw mill feed bins or into the storage yard at any point along the course of the conveyor.

Extension of this belt conveyor to permit filling the raw mill feed bins while the crushing plant is operating, the use of a belt conveyor to deliver clinker to the clinker mill feed bin continuously, and careful design of the bins, reduces necessary operating time for the storage yard crane to only one shift per day.

Raw-Materials Grinding

General Design Since all power used in this plant must be generated on the plant site (using imported oil which is at best expensive), all possibilities of saving power were investigated. Laboratory tests revealed that the use of a ball mill operating in closed circuit with a classifier would produce a more desirable product at lower power consumption than could be obtained with the conventional multiple-compartment mill operating in open circuit. These factors appear to have their basis in the fact that both constituents of the raw mix contain very hard and very soft components. In an open-circuit mill it would be necessary to retain all of the material in the mill a sufficient length of time to reduce the hardest fractions to the necessary fineness. Retaining the material in the mill for such long periods would cause a considerable proportion of the mill power input to be expended wastefully on the more easily ground fractions, reducing them to an unnecessarily high fineness.

Although it is generally believed that finer grinding of raw materials has a beneficial effect on their chemical combination in the kiln, it is doubtful that the fine grinding of certain fractions accomplishes any of these effects. In fact, the presence of the overground material, slimes because of their high specific surface, tends to increase the amount of water required to produce a pumpable slurry. Since this additional moisture will require additional fuel to accomplish its evapora-

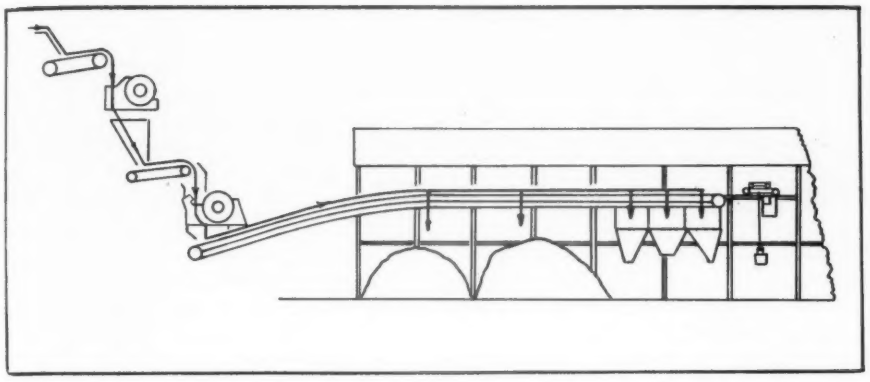


Diagram of crushing and raw-materials storage.

tion in the kiln, it would be very objectionable from an over-all plant efficiency standpoint.

When the raw materials are ground in a ball mill operating in closed circuit with a classifier, the material is retained in the mill only a short time and passed on to the classifier, where the portion which has reached product fineness is removed and the rest returned to the mill for more grinding. In this way the grinding power of the mill is, to a greater extent, concentrated on the coarser and harder components of the raw mix, and the minimum of power is wasted on producing undesirable slimes.

Raw-Material Feeders In order accurately to facilitate the proportioning as early in the process as possible, Merrick, 24-inch, Type WS Feed-o-weights will be used to withdraw the raw materials from their respective bins and deliver them to the grinding circuit.

In the initial operation, when standard Portland cement will be the only product of the plant, two types of slurry will be alternately produced in the raw grinding circuit. One of these will be approximately 1 per cent. higher in CaCo3 content than is required for kiln feed, while the second will be about 1 per cent. lower in CaCo3 than the kiln feed. These two types of slurry will be treated separately through the thickening and storage stages, and then blended together in the correct proportions to produce feed for the kilns.

In order to simplify changing from the production of one type of slurry to the other, without the loss of proportioning accuracy which would accompany resetting the feeders each time the type of slurry was changed, three feeders were provided. In this way, one feeder could be set to deliver the calcareous component at a rate commensurate with the mill capacity, while one of the remaining two would be set to deliver the correct amount of argillaceous material to produce the high-lime slurry, (it would be used only when that type of slurry is being produced) and the third would be set at a slightly higher rate and would be used only when low-lime slurry was desired.

Raw Mill The ball mill in which the raw materials are to be ground will be an Allis-Chalmers 9-foot by 13-foot ball mill, equipped with combination drum-and-scoop feeder, Allis-Lorain rolled-steel liners, a low-level discharge grate, and a sand wheel on the discharge trunnion, to elevate the mill product to permit gravity flow of the materials from the point through the classifier. The mill will be driven by a 500-hp., 80 per cent. synchronous motor which will be connected to the mill countershaft through a Cutler-Hammer magnetic clutch which will permit starting the motor without load and thus reduce the peak starting current demand on the power plant.

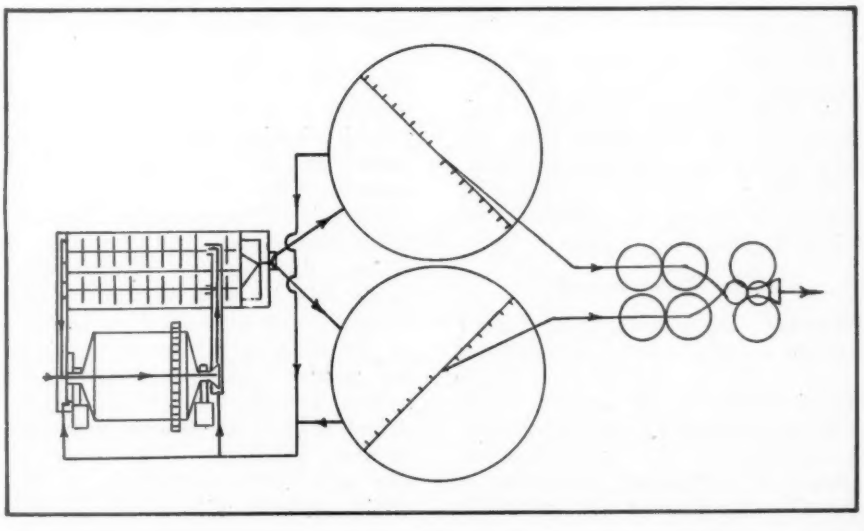
Classifier The raw grinding ball mill will operate in closed circuit with a 14-foot-wide by 28-foot, 3-inch long style QSF, Dorr rake-type classifier. Although a bowl-type classifier is usually used in circuits producing cement raw materials, the settling characteristics of the materials and the quantity to be handled indicate the use of a rather wide, rake-type unit.

Thin Slurry Pumps The product overflowing the classifier discharge will be collected in a sump and delivered to either of the two thickeners, located on a hill approximately 200 meters away and approximately 30 meters high, by either of two Allis-Chalmers 6-inch Type CWG slurry pumps powered by 30-hp. induction motors.

Thickeners Because the wet-type classifiers require dilution of the mill product to approximately 85 per cent. water in order to function properly, it is necessary to thicken the slurry before it can be used as kiln feed. For this operation two 115-foot-diameter by 13-foot-deep, Type SSG, Dorr thickeners will be installed. These units will be equipped with compression pickets to cut up the layers of agglomerated particles, which usually form in the intermediate zone of a thickener, and thus liberate any water which may have accumulated below, and a feed distributing launder which distributes the feed uniformly across the cross section of the thickener instead of a small area at the center.

Thick Slurry Pumps The thickener underflows (thickened slurry) are discharged by gravity into a two-compartment sump from which they are pumped alternately to the slurry storage tanks. The thickener overflow (clear water) is returned to the grinding circuit by gravity.

The flow through raw-grinding, slurry-storage age and blending stages.



Slurry Storage and Blending

Because of the large volume of slurry held in process in the thickeners, at least a portion of which will become available at a rate in excess of that at which it is used, a large slurry storage capacity is not required. Therefore four tanks 22 feet in diameter by 20 feet deep will be provided for the storage of the finished slurry (two for each type of slurry) and two identical units will be provided for blending. Each of these six tanks is to be provided with an Allis-Chalmers, propeller-type, mechanical agitator and with air lines by which emergency agitation could be accomplished in the event of power failure in the mechanical agitation system.

All six tanks are to be arranged to discharge through open launders into either compartment of a two-compartment pump sump. Two 6-inch Wilfley slurry pumps (one on each compartment) will receive the slurry and deliver it to any of the six tanks or to the kiln-feed tanks. A third 6-inch Wilfley pump will be arranged to withdraw slurry from either compartment of the slurry sump and serve as a spare for either of the two main pumps.

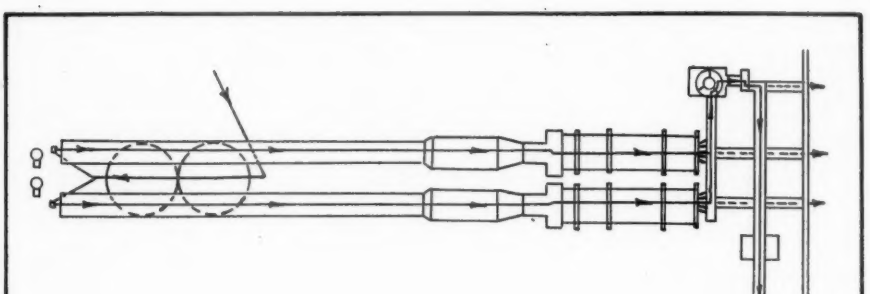
The two blending tanks are arranged with extra outlets, so that their contents may flow by gravity directly to the kiln feed tanks without going through the pumps or sumps.

The corrected slurry, after it has been approved as kiln feed by the plant chemist, will be stored in two 28-foot-diameter by 15-foot-deep kiln feed tanks located in the kiln building under the feed end of the kilns. Since only one type of cement will be produced during the initial operation, these tanks will be used alternately for either or both kilns. They can, however, be quickly changed over so that each kiln can be used to produce a different type of cement.

The kiln feed tanks will be equipped with Minogue, combination air-mechanical agitators. The slurry will be discharged from the tanks into a two-compartment sump and will be delivered to the kiln feeders by either or both of two 3-inch Wilfley slurry pumps.

Kiln Department

General Design Because imported fuel oil will be used for firing the kilns, the cost of which would constitute the largest single item in the production of clinker, installation of the most efficient kilns and fuel-saving auxiliaries in the kiln department was essential.



Layout of two kilns, which will be fed by Ferris-wheel-type slurry feeders.

Climatic conditions in Panama are such that construction work is more or less limited to the dry season. Consequently, the demand for cement is seasonal. Furthermore, the warm, very humid atmospheric conditions make it impractical to store large quantities of either finished cement or cement clinker over long periods. It was therefore necessary to distribute the clinker producing capacity between two units, thus permitting half-capacity operation at good kiln efficiency when the demand for cement is low.

Kiln Feeders The slurry will be fed to the kilns by Ferris-wheel-type slurry feeders. The power for driving the feeders will be obtained from 10-kw. a.-c. generators driven from the kiln motors. Thus, the feed rate to the kilns will be synchronized with the kiln speed, insuring a constant quantity of slurry being delivered to the kilns each revolution.

Each feeder will be provided with a calibrated slurry measuring pot, so that the feed rate of the kilns can be determined at will.

Kilns The clinker production will be accomplished in two rotary kilns 300 feet long, each having a burning zone 25 feet long, an "enlarged calcining zone" 10 feet in diameter and 34 feet long, and the remainder 7 feet, 6 inches in diameter. Each unit will be carried on five carrying mechanisms and driven by a 60-hp., d.-c. motor. Conventional lining will be used in the burning and calcining zones, and the balance of the kilns, with the exception of the portion occupied by the chain system, will be lined with wear-resisting lining backed with high-temperature insulation. The section of the kiln shells occupied by the chain systems will be lined with castable refractory at the hot end and ordinary Portland cement concrete at the cool end.

The feed end of each unit will be equipped with a simplified, all-steel, feed-end connection, which will replace the usual cumbersome and expensive dust chamber. This unit will contain the feed-end air seal, feed spout, a simple connection to the exhaust fan, and a hopper bottom which will automatically discharge any slurry spilled from the kiln back into the kiln feed tank. The discharge ends of the kilns will be provided with "Air Cooled" discharge and castings designed to prevent overheating and warpage of the kiln ends, and permit the use of more positive seals between the kiln and firing hoods. The use of the air-cooled end castings eliminates the necessity for admitting cool atmospheric air into the kiln at this point to keep the end of the kiln from becoming overheated, and thus permits a greater portion of the air required for combustion to be drawn from the clinker cooler where it can be obtained in a highly-preheated condition, thus recovering considerable quantities of heat which would normally be wasted.

Coolers The hot clinker will be discharged from the kilns directly into two 3-foot-wide by 50-foot-long Allis-Chalmers, air-quenching clinker coolers. In these coolers the hot clinker is conveyed slowly over grates by the reciprocating motion of the cooler body. Atmospheric air under slight pressure is forced up through the grate and the bed of clinker as it is being conveyed along. The stationary upper housing of the cooler is divided into two sections by a hinged baffle wall. Thus the hottest air arising from the clinker bed at the feed end of the cooler is directed into the kiln where it is used as preheated combustion air, and the balance is dis-

charged to the atmosphere. The clinker will be cooled to within 100 to 150 degrees of atmospheric temperature. The use of this highly-efficient cooler not only recovers a maximum amount of the sensible heat from the clinker in the form of preheated combustion air, thus saving fuel, but also cools the clinker sufficiently to permit transferring it directly to the clinker mill to be ground into cement without the usual expensive storage and rehandling operation.

Clinker Handling The cooled clinker, as it is discharged from the cooler, will pass over a grizzly where the plus 2½-inch pieces will be removed and discharged on a grating to be broken up by hand before rejoining the clinker stream. The minus 2½-inch clinker will discharge onto a shaking pan conveyor (merely an extension to the cooler) which conveys it to a chain-drag cross conveyor serving both coolers. If desired, the shaking conveyor can discharge the clinker directly into the storage yard, thus by-passing all succeeding crushing and handling operations.

In normal operation the clinker will be discharged into the drag conveyor and delivered to an Allis-Chalmers No. 322, Type R, gyratory crusher which will reduce it to minus ½-inch and discharge it into either of two duplicate elevators. If the clinker does not require crushing, or if the crusher is inoperative, the clinker can be discharged directly from the drag conveyor to the elevators.

Two clinker elevators, either of which will handle the combined output of the kilns, have been provided to insure continuity of operation. These elevators will elevate the crushed clinker and discharge it onto a belt conveyor which will deliver it to the clinker mill feed bin or, if conditions demand, the clinker may be discharged from the elevators directly into the storage yard.

The belt conveyor used for transporting the crushed clinker from the clinker elevators to the clinker mill bin will be equipped with a Merrick Model E Weightometer which will record the quantity handled. The discharge end of the conveyor will be arranged in such a manner that when the clinker mill feed bin is full, the clinker will be automatically discharged into the storage yard.

Oil-Burning Equipment The kiln fuel will consist mainly of bunker C oil, but at times lower grade fuels may be used. Since these cells are quite viscous even in tropical climates, the oil must be heated to approximately 250 degrees F. to obtain good atomization. This will be accomplished with tube-type primary heat exchangers located in the outlet of the oil-storage tanks and similar secondary exchangers on the kiln burning floor. The steam for these exchangers will be supplied by a Keewanee, 30-hp., oil-fired Scotch marine boiler. The oil will then be delivered to the oil burners at approximately 250 pounds per square inch by either of two DeLaval pumps. The atomization of the oil will be accomplished in two Allis-Chalmers (one for each kiln) oil burners designed especially for use on cement kilns. The primary air used in these burners will be delivered at approximately 1 pound per square inch pressure by Bailey Type H blowers. The outstanding feature of these burners is that no inert medium, such as steam, is required to accomplish atomization and therefore higher flame temperatures can be maintained.

Kiln-Control Equipment A separate kiln control cubicle will be provided for each kiln. These cubicles will contain automatic draft and oil flow controllers; kiln burning zone, exit gas temperature, kiln speed, and draft recorders; a special instrument designed to maintain a constant depth of clinker on the cooler grate; and such miscellaneous instruments as oil and primary air pressure gauges, ammeters for principal motors, a.-c. and d.-c. line voltmeters, all pertinent push button stations and speed controllers, electric clock, signal lights, etc. One of the cubicles will contain an additional panel on which will be mounted the instruments for the oil heating and pumping system.

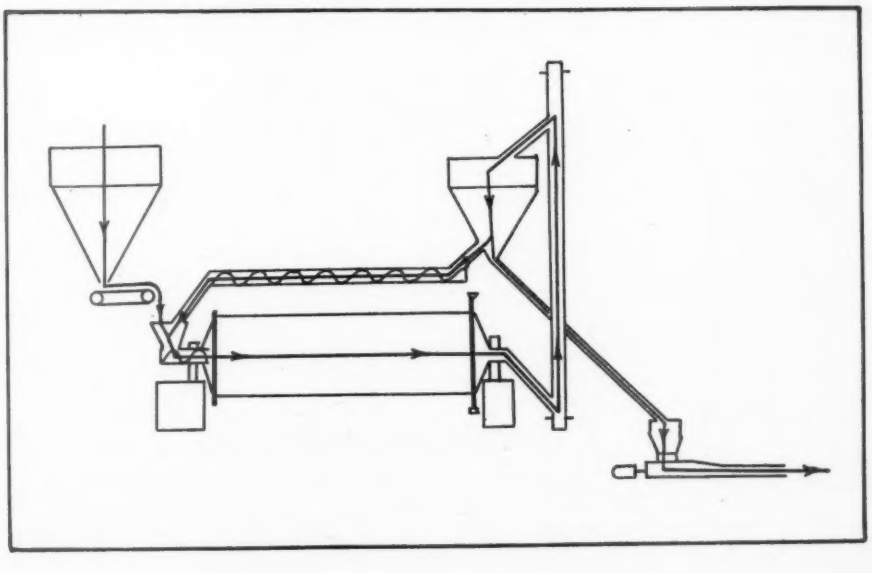
In general the kiln control equipment, as well as the rest of the plant, has been designed to make the efficient operation of the plant as easy as possible for the operators, and by this method it is hoped that they will strive to keep operations at or nearer their optimum.

Clinker-Grinding Department

General Design The grinding of the clinker-gypsum mixture to finished cement will be accomplished in a three-compartment Compeb mill. This mill is arranged so that it may be operated either in open circuit or in closed circuit with a Raymond 14-foot-diameter air separator, depending on the product desired, by merely switching the mill discharge from the air separator circuit directly into the Fuller-Kinyon cement transport system.

Feeders The clinker and gypsum will be withdrawn from their respective bins by Merrick Feedoweights, and injected into the preliminary-grinding compartment of the mill by a manganese-steel screw feeder extending through the mill trunnion.

Mill The grinding will be done in an Allis-Chalmers 7-foot-diameter by 35-foot-long Compeb mill. This mill will be equipped with two division heads which divide the interior of the mill into three compartments, thus permitting the use of the correct grinding media to meet the grinding conditions in the various compartments. The mill will be powered by an Allis-Chalmers 700-hp., 80 per cent., Type AK synchronous motor directly connected to the mill countershaft through a



A 3-compartment mill will grind clinker in either open or closed circuit.

Cutler-Hammer magnetic clutch.

When the air separator is in use, the mill will discharge into a bucket elevator which will deliver the material into another bucket elevator which will in turn deliver the material to a point from which it can be spouted to the air separator by gravity. The product will flow by gravity from the separator to the Fuller-Kinyon cement transport system which delivers the finished cement to any of the four cement-storage silos. The material requiring more grinding will be returned to the mill feeder by a screw conveyor.

Because considerable heat is generated in a clinker mill, and high mill temperatures usually affect the capacity adversely, approximately 3,500 c.f.m. of atmospheric air will be drawn through it to remove this heat. This cooling air, as well as air drawn from hoods over dusty material transfer points, will be vented to the atmosphere through a Sly bag-type dust collector.

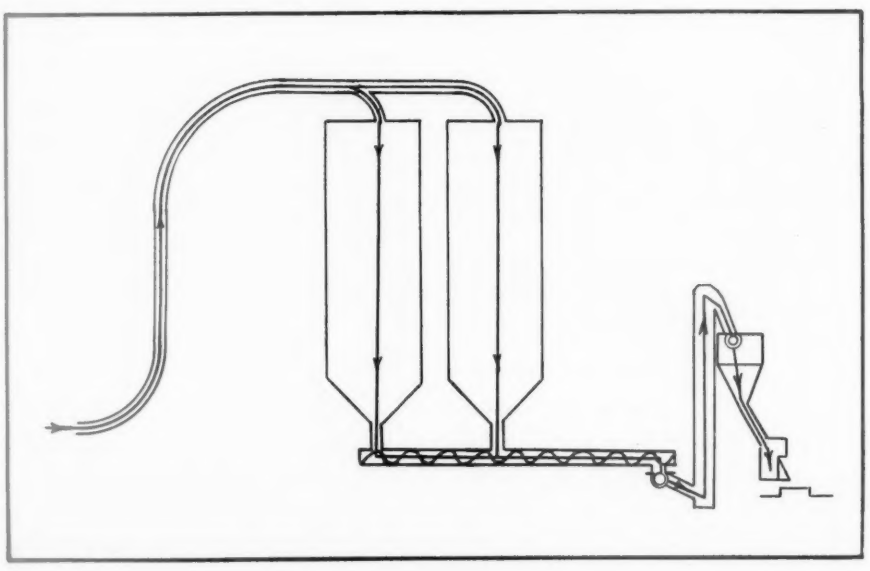
All of the equipment in both the raw and clinker-grinding departments is arranged so that a hand-propelled, bridge-type crane can pass over and lift parts to and from either mill and most of the auxiliary equipment.

Cement Storage and Packing

The finished cement will be stored in four 26-foot-diameter by 90-foot-high reinforced concrete silos. A fifth storage compartment is obtained by utilizing the interstice. Each of the four main silos is provided with a steel cone bottom, thus permitting all the cement contained in a silo to be withdrawn from one opening. In order to facilitate bulk loading a valve and spout will be placed in the side of each silo. In this way trucks hauling bulk cement can be loaded without interfering with the packing or the loading of sacked cement.

The cement to be packed in bags will be withdrawn from the silos by two 16-inch-diameter screw conveyors, one under each row of silos. These conveyors will discharge into a cross screw conveyor which will deliver the cement to an elevator. The packing section is arranged in such a manner that spillage and floor sweepings will return to the cross conveyor by gravity, thus eliminating the necessity for a separate conveyor to handle them. The elevator will lift the cement to the top of the packing machine feed bin and discharge it into a special screening-type screw conveyor which will remove any debris and deliver the cement into the bin. The cement will be packed in No. 94 paper bags by a Valve Bag, Type 107-FC, 4-tube packing machine and loaded onto trucks, manually, from loading platforms provided on both sides of the packing house. All bulk shipments will be weighed on the trucks. The plant capacity is to be 300 metric tons (1,760 barrels) for a 24-hour operation.

Two 90-foot concrete silos will store cement ahead of the 4-tube packing machine.



Power

The electrical power required for the operation of the plant will be generated and distributed in a power house located adjacent to the mill room. With this arrangement, approximately 60 per cent. of the power will be consumed within 100 feet of the point at which it is generated. The most remote consumption point is approximately 400 feet distant. The use of this arrangement eliminates the necessity for generating at higher voltages and then stepping down to operating voltage. In addition such equipment as the motor-generator set distribution switch gear, large motor starters and air compressor will be located in the powerhouse where they can be attended by the powerhouse personnel.

Power will be generated by three Allis-Chalmers, 600-kw., three-phase, 60-cycle, 440-volt a.-c. generators. These units will be driven by three Worthington model E-6 six-cylinder, four-cycle, Diesel engines. An Allis-Chalmers E-60 power unit will serve as an auxiliary generating unit to provide light and power for small tools, starting compressors, oil pumps, etc., for starting up the plant after a shut down or an emergency.

The generator control panels, distribution switch gear, and the starters for the two mill motors and the motor-generator set were designed as one unit. They are of the latest totally-enclosed, dead-front, enclosed-bus type. Each generator control panel will be equipped with a circuit breaker, voltmeter, and watt-hour meter as well as the usual generator control equipment. The busbars from these panels will pass directly to the distribution switchgear. All of the power used in the plant, with the exception of that consumed by the two large mill motors and the motor-generator set, will be divided into eight main circuits, each of which serves equipment related to the crushing plant, mill room, slurry storage, kiln department, storage yard, packing house, powerhouse auxiliaries and lighting.

The starters for the 500- and 700-hp. synchronous motors driving the grinding mills and the 150-kw. motor-generator set are connected directly to the main powerhouse busbars. This arrangement eliminates the necessity of passing these heavy leads through the distribution system and places the starters in the powerhouse where they can be serviced by trained personnel. Since these starters are of the totally-magnetic, time-sequence type which can be operated by remote push-button stations, the actual control for the motor will be located at a point convenient to the machine operator.

Motor-Generator Set The direct current required for driving the rotary kilns, clinker coolers, synchronous motor excitation, and operation of the magnetic clutches, will be gen-

(*Continued on page* 94)

Ideal Cement Company Utilizes War Surplus Equipment for Expansion

IMMEDIATELY following the close of the Japanese War in August, 1945, the Ideal Cement Company attempted to put into operation its expansion and rehabilitation program.

Its mills in Colorado, Utah, and Montana had suffered considerably during the war years for lack of maintenance, due to the unavailability of materials and the scarcity of labor. Also, it had been determined by the Board of Directors to increase and expand production in those three states to take care of the tremendously increased post-war demand for cement, which it appeared would surely develop. A considerable part of the Bureau of Reclamation program is centered within reach of the Ideal plants in those three locations; and it is a fundamental part of Ideal's policy to produce an adequate amount of cement to fulfill requirements for cement in those areas which it serves.

From August until December efforts were made to place orders for kilns, mills, motors, etc., with but little success. Deliveries were uncertain, prices were not firm, and delivery dates lengthy in the first place, and were postponed even further because of strikes and other disruptions. Therefore, since several defense plant installations had been made, involving the use of machinery and equipment exactly the same as that needed, it was decided, immediately after the first of the year, to visit such installations, with a view to locating such machinery as was needed in the improvement program, and, if possible, making purchases in the hope of accomplishing two things: (1) acquiring such equipment on a reasonable basis; and (2) keeping such equipment in productive use.

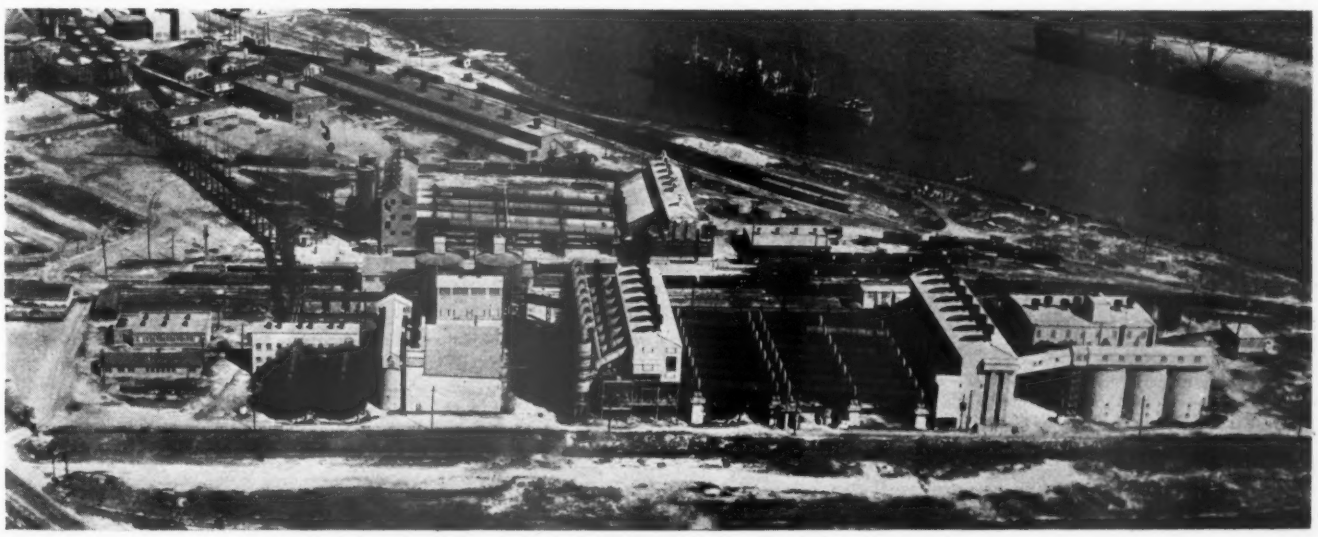
After several defense plant operations had been observed, the sinter plant at Mobile, Ala., was inspected. It was found to contain exactly what was needed in the program in the West. The sinter plant had been built to process low-grade alumium ore, getting it in shape to be handled by the Aluminum Ore Company's Bayer plant for reduction to alumina, at a time when the submarine menace seriously interfered with the importation of high-grade bauxite ore from South America. By the time the sinter plant was completed, however, the submarine menace no longer existed, and the sinter plant, therefore, never was operated.

Needless to say, the sinter plant at Mobile is not laid out exactly as a cement plant would be laid out according to good engineering practice. However, raw mills, finish mills, and kilns, as well as all of the necessary conveying equipment, slurry tanks, laboratory, etc., were in place. During investigations, it was learned that there was an acute shortage of cement in Mexico and South America, as well as a decided shortage along the Gulf Coast areas. After careful consideration, it was decided to leave part of the equipment in place for the production of Portland cement at Mobile, at least during the time of stringency.

The bid of Ideal Cement Company on this basis was accepted by the War Assets Administration, and work is now under way to convert two kilns into cement production at Mobile. Three kilns will be moved to Portland, Colo., and two to Devil's Slide, Utah, along with such other equipment and machinery as is available to complete the installations at those two locations. It is expected that the production in Colorado and Utah will be nearly doubled when these installations are completed.

The increased production in Montana is being taken care of with new equipment, orders for which were placed more than a year ago and deliveries of which are being effected at the present time. The increased production in Montana will be approximately 30 per cent., and it is felt that such increased production in the mountain area will be adequate to take care of the demands which are expected to develop under the post-war reclamation and highway program.

Mobile aluminum processing plant to produce Portland Cement under new program.



New Rock Wool Concern To Locate at Ada, Oklahoma

Rock Products Manufacturing Corp., a newly-organized company, has announced that it will build a rock wool plant at Ada, Oklahoma. Stone for the rock wool will be obtained from a deposit near Troy, Okla., where the company purchased 120 acres of land. It will be crushed at Troy and shipped to Ada for processing.

CEMENT PLANT LUBRICATION

PART I—CRUSHING AND GRINDING

By A. F. BREWER

Technical and Research Division
The Texas Company, New York

THE use of concrete for building and highway construction purposes is often too casually accepted. It stems from a huge industry—cement. There is more or less of a direct tie-up between the cement industry and virtually every other phase of manufacture today.

Cement is unique in that it involves a very low-priced raw material. Treatment and handling of this latter, however, is expensive; hence, the value of the finished product. The power consumed in the several processes of handling and grinding must, of necessity, be high, due to the heavy duty required of the machinery. Lubrication must be given very careful attention, for it directly affects power costs and production efficiency. Failure of a crusher or a conveyor pump, or a kiln tied up, due to impaired lubrication, may easily disrupt the production schedule, especially if this occurs when rush orders must be filled.

While cement can be manufactured in several ways, i.e., the dry process, the semi-dry process or the wet process, the general run of machinery employed will be very much the same except that in the wet and semi-dry process the "slurry" must be pumped to the various grinding mills and storage tanks prior to evaporation and burning. Conveyors are used in the dry process for this purpose.

Crushing and grinding involves two distinct operations:

First, the raw material must be reduced in size. This means delivering the raw product to the jaw crusher, hammermill, or gyratory for primary breaking.

Second, it must be pulverized. Here the hammermill, gyratory or centrifugal pulverizer fits in.

The Jaw Crusher

In the jaw crusher we are concerned with the bearings of the pitman and the eccentric shaft. The bearings carry the pitman or heavy steel casting which oscillates with its bearing as the point of suspension to bring about the requisite degree of crushing.

The Pitman The pitman bearing is often water cooled; in addition, in certain larger crushers it is relieved of much of the weight by the use of links and coiled springs.

Grease is very often the most adaptable lubricant, being applied to the bearing either by means of pressure lubricators or via reservoirs equipped with wool waste or some other form of pad retainer to insure positive lubrication. Where pressure lubrication is employed, a medium-to-heavy cup grease will frequently be satisfactory. Wool, waste or pad lubrication, however, requires a thinner lubricant, relatively fluid in consistency, for the lubricant must penetrate the wool readily.

The objective is the same in either case; the lubricant must be capable of reaching the lower bearing surfaces where pressure and friction are the greatest. Certain builders provide for delivery of grease (under pressure) to both the top and bottom of the bearings to assure the most positive lubrication.

Eccentric Bearings The weight of the pitman must be compensated for by springs, etc., otherwise its weight will be exerted upon the eccentric shaft bearings, with the probable result that the lubricant will be unable to penetrate and maintain the requisite friction-reducing film at these points.

So crusher construction always must be taken into consideration. Where springs and links are used to balance the pitman, pad lubrication using a light grease will probably work satisfactorily on the eccentrics. Where the weight of the pitman is exerted on the eccentric bearings, as well as on its own supports, pressure lubrication with a heavier grease will give more positive protection.

Hammermills

Hammermills are impact crushers. As the material is crushed it passes to a hopper at the bottom of the mill. In some plants the product is passed to external screens where oversize particles are separated and returned to the hammermill for further reduction in size.

The type of mill controls the points requiring lubrication. In general, there will be the roll-shaft bearings, and in certain machines, the hammer roll bearings and pinion shaft bearings. Certain hammer rolls are mounted upon roller bearings enclosed in dust-proof housings. They normally operate in a bath of oil, the source of which is a large reservoir fixed to the end of the hammer roll shaft. A straight mineral crusher oil of sufficient viscosity to insure adequate body and the prevention of metallic contact at the operating temperatures should be used on such bearings. Plain bearings in turn normally require a medium-to-heavy grease.

Centrifugal Mills

In a centrifugal mill a set of balls, or rolls, moves around the internal circumference of a wearing ring or die. This develops considerable pressure against the die, especially in the centrifugal roll mill; the material is ground between the rolling elements and this die. In operation the main shaft bushings require lubrication. Heavy oil or grease is generally used. The intermediate bearing of the ball-type mill, however, is more inaccessible; here grease lubrication has been found to be most dependable.

The lower bushing and thrust bearing are arranged to operate in a bath of oil. Steam cylinder oil or crusher oil may be used successfully for such lubrication, but when the gear drive and ball thrust bearing are incorporated in the same housing, only lubricants suitable for ball-bearing lubrication should be used. Where driving gears are involved they may be successfully operated in a bath of light gear lubricant or medium-viscosity oil.

Roll-Shaft Lubrication The roll-shaft bearings on the centrifugal mill sometimes may present a lubrication problem. Pressures on these bearings are relatively high, some rollers weighing several hundred pounds.

When the bearings are grease lubricated the course of the lubricant is by gravity from the reservoir in the top of the journal housing to the clearance space between the shaft and its bushing. This clearance is comparatively low, for rigidity is an important factor in operation.

The lubricant, therefore, must be capable of maintaining a constant

and effective film within the clearance space; furthermore, it should not tend to leak past the seal at the base of the bushing.

Frequency of re-lubrication will depend upon the nature of the grease, the extent of vibration and the operating temperature. Generally, a fairly heavy grease will be best especially if its oil content is of sufficiently high viscosity to assure of a lubricating film which will withstand the pressures involved and the vibratory action.

It is also practicable to use oil for the roll shaft bearings by providing a suitable reservoir and means for delivery or circulation to the bearings. Circulation can be developed automatically *via* suitable grooving cut around the base of the roll shaft.

Gyratory Crushers

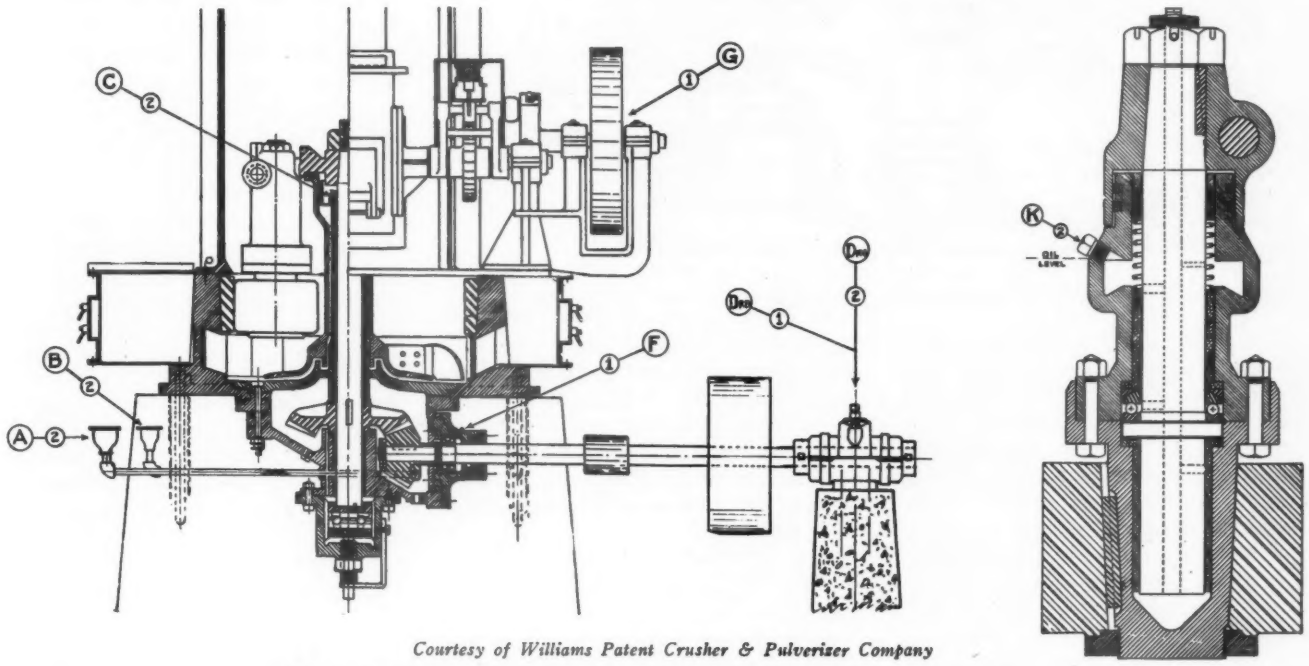
The gyratory crushes by the circular rolling motion of the crushing head, which is motor-driven by gearing, or belt drive through an eccentric at the bottom of the shaft. By reason of its circular rolling motion, the head successively approaches every point of the interior of the throat. This action results in a continuous breaking of the material which subsequently falls through at that point of the throat from which the head is most distant.

The gyratory crusher will frequently give a misimpression as to the extent to which its operation depends upon lubrication. Its lubrication is not so simple as it would seem. Due to the peculiarities of construction and the heavy duty involved, gyratory lubrication is oftentimes a matter of considerable difficulty. Not only are the bearings frequently exposed to a great deal of grit and dust and subject to extremes of temperature, but some of them also carry tremendous loads.

How Construction Influences Lubrication

As mentioned, the gyratory crusher may be of the geared or gearless type. The gear driven crusher has two points requiring lubrication which are not found on those employing the gearless drives: i.e., the gear and countershaft bearings.

The chief difficulty in lubricating



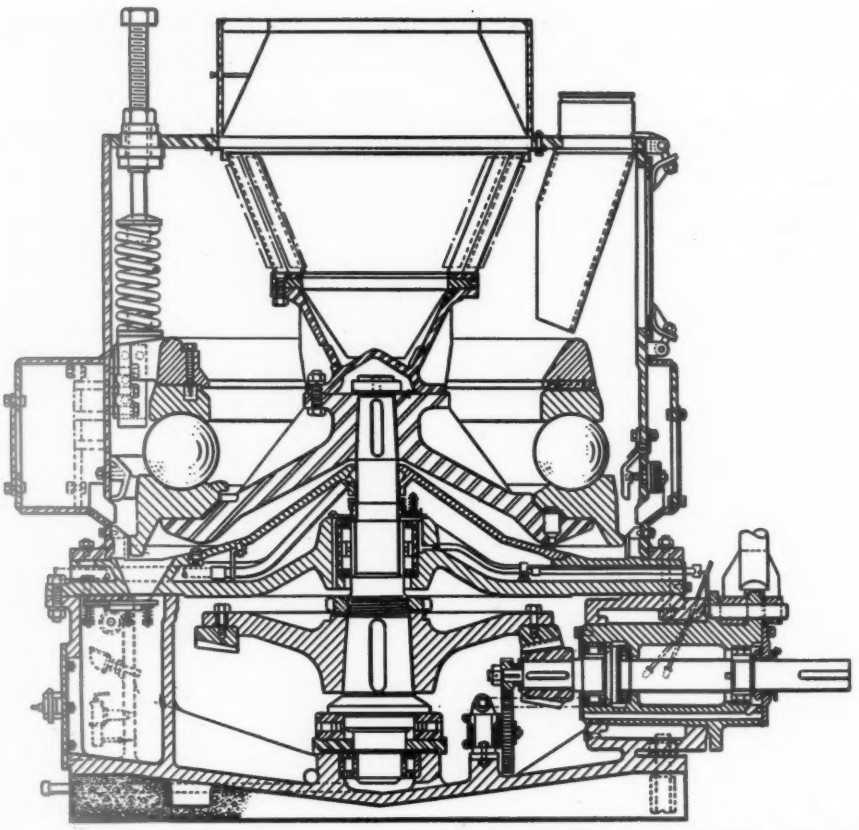
Courtesy of Williams Patent Crusher & Pulverizer Company

Fig. 1. Cutaway views of the Williams roller mill, showing lubrication system.

LUBRICATING INSTRUCTIONS FOR WILLIAMS ROLLER MILLS

Location	Portions Lubricated	Type of Lubricant	Frequency of Lubrication	
			(Small Mills)	(Medium and Large Mills)
A	Lower bronze bushing, step box thrust bearing. (Overflow to oil reservoir in gear housing.)	2	Inspect daily—keep filled but permit excess to overflow from top of oil cup.	Inspect daily and keep filled.
B	Bevel gears.	2	(Also lubricated from "A" on small mills.)	Inspect daily—keep filled but permit excess to overflow from top of oil cup.
C	Upper bronze bushing, middle bronze bushing.	2	.....	Inspect daily—keep filled.
Dro	Outboard bearing (if ring-oiling type.)	2	Inspect weekly.	Inspect weekly.
Drb	Outboard type (if ball or roller type.)	1	Inspect weekly.	Inspect weekly.
E	Upper bronze bushing.	1	Several turns daily; refill when necessary.	.....
F	Inboard bearing.	1	Weekly or oftener as required.	Weekly or oftener as required.
G	All bearings on feeder mechanism	1	As required.	As required.
H	Fan bearings (not shown.)	1	Weekly or oftener as required.	Weekly or oftener as required.
K	Roller journals.	2	Check oil level daily; keep filled to proper height.	Check oil level daily, keep filled to proper height.

Lubricant No. 1 should be a soda-soap grease having a high resistance to oxidation, freedom from separation in working, and no tendency to corrode the highly-polished surfaces of the ball and roller bearings which it must adequately lubricate.
Lubricant No. 2 should be a high-quality mineral oil having the characteristics of ready separation from water and high chemical stability, with viscosity approximately 900 seconds Saybolt at 100 degrees F.



Courtesy of the Babcock & Wilcox Company

Fig. 2. Lubrication arrangement of a Babcock & Wilcox Type E pulverizer.

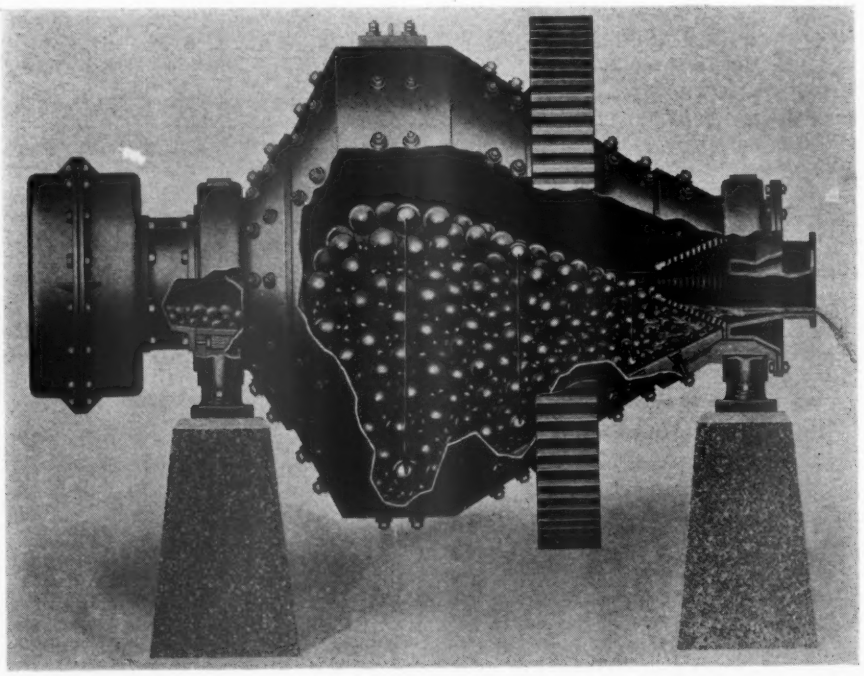
countershaft bearings involves dust or grit contamination, so they are generally oil-lubricated by sight feed cups or ring oilers, using an oil of from 500 to 900 seconds Saybolt Universal Viscosity at 100° F., according to the speed, which rarely exceeds 600 r.p.m.

While ring oiling is a refinement it is of advantage in that any grit or dust is washed from the journal and carried into the reservoir. This latter, on the other hand, must be of adequate capacity. Furthermore, it must be cleaned frequently, otherwise grit will accumulate, to ultimately result in serious abrasion of the journal and bearing due to impaired lubrication. Counter shafts are often fitted with outboard bearings, as these steady the shaft and take a great deal of load off the main bearing.

Gear Lubrication Gears are subjected to severe duty in crusher service. Dust rings are fitted about the shaft where it enters the gear case and all openings are covered, but despite all these precautions a certain amount of dust and finely broken rock will find its may into the gear case, to contaminate the gear lubricant. The latter, therefore, must not be too thin or low in viscosity, otherwise the film developed on the gear teeth will have insufficient body to prevent grit from coming into actual contact with the gear teeth to cause abrasion as they pass into mesh. A straight mineral oil of from 90 to 145 seconds Saybolt universal at 210° F. will function well under these conditions.

The lubricant must resist the drying action of the dust and prevent its packing between the teeth of the gears. This might cause the gears to spring and throw unnecessary pressure upon the counter-shaft bearings and eccentric. Where a crusher may have to operate in cold weather, heating elements are installed in the oil reservoirs so as to be sure the oil is fluid. Pre-heating when starting cold at the beginning of a shift in the winter, is most important. Pre-heating will insure against drag, excessive power consumption and the possibility of wear.

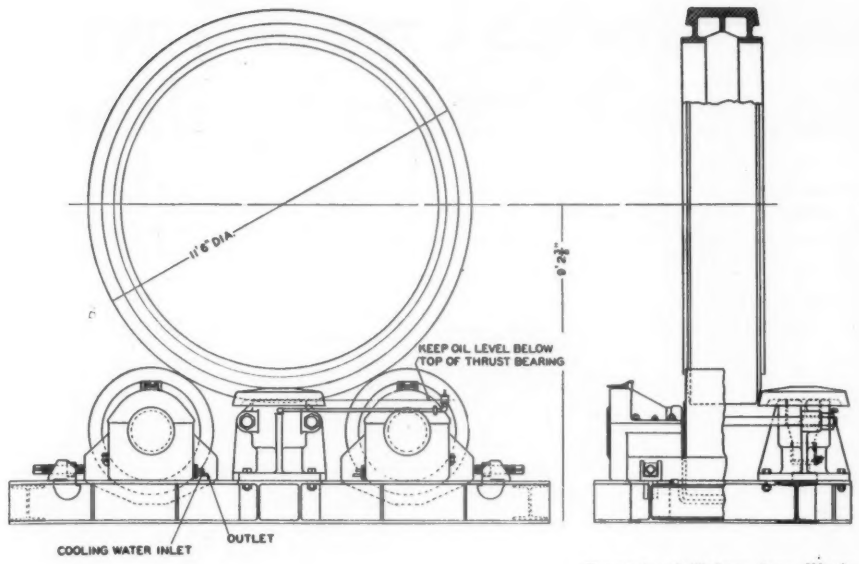
Fig. 3. Cutaway of a Hardinge conical mill, showing relative size of balls, the drive gear and bearing pedestals.



Courtesy of Hardinge Company

The Eccentric As that part which imparts the gyratory motion to the shaft the eccentric requires very careful lubrication. As the eccentric revolves within a bushing and about the shaft, there are two surfaces to be lubricated. In addition, there is the brass wearing ring which carries the weight of the bevel gear and eccentric. In some machines, the bottom of the shaft is resigned to fit very loosely in the eccentric so that it may be tipped from side to side. This throws all the pressure upon a small area near the top of the thickest part of the eccentric sleeve and may cause it to heat and wear rapidly unless properly lubricated.

Automatic Lubrication Is Customary Oil circulation under pressure throughout these mechanisms is practically standard on all such equipment. This assures of continued and dependable maintenance of a sufficient flow of oil. In this way the oil



Courtesy of Vulcan Iron Works

Fig. 4. Assembly of 14-inch by 18-inch single-roller double bearing, showing method of oiling the thrust bearing.

can serve a twofold purpose: to carry away heat and to maintain a suitable lubricating film.

How the Oil Pump Works To accomplish this a suitable oil pump is located at the bottom of crusher, either within or adjacent to the oil reservoir or chamber in the bottom plate. An ample supply of oil, from 30 to 100 gallons, is contained in the system, which as a rule includes a suitable filter or strainer through which the oil passes at each circulation. Along with the general dust-proof construction of the modern gyratory, this insures against the entry and circulation of an excess of dust through the system. Meanwhile, all the lower wearing parts are served with a flood of clean, cool oil while the gyratory is operating; the oil pump starts simultaneously with the crusher, operates at a speed commensurate with the rate of crushing and stops when the crusher stops.

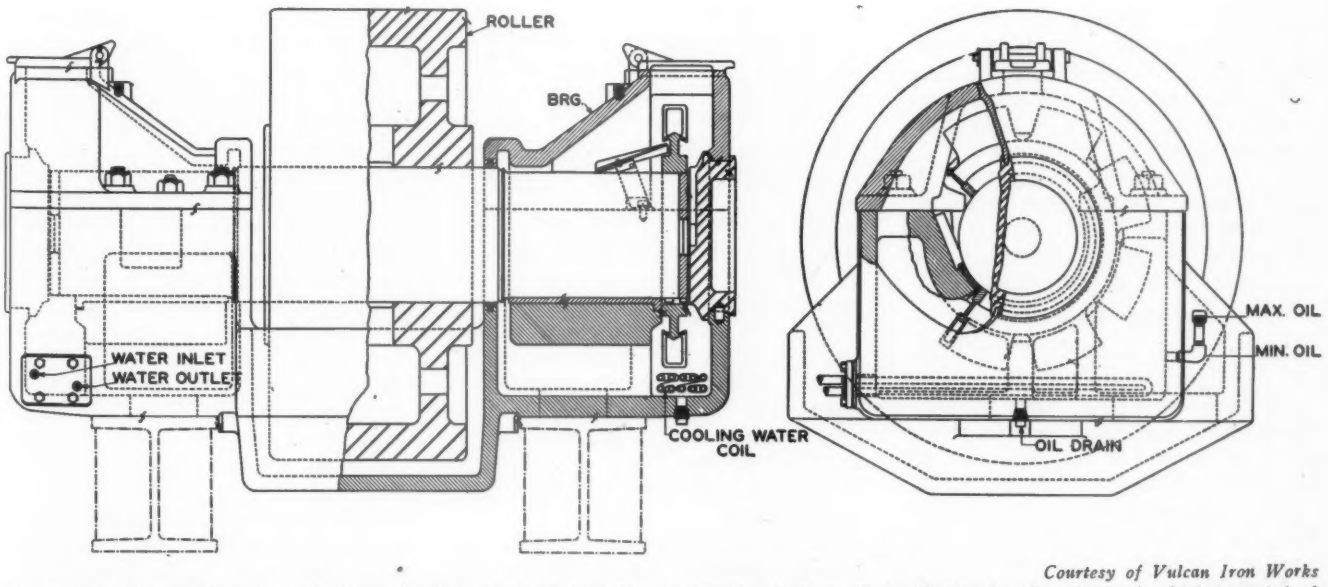
Temperature Control a Factor of Safety At times the oil in a gyratory system must be cooled or heated. For example, where hard rock is to be crushed, during very hot weather, it will be found advantageous to provide for cooling the oil during its circulation. The builders provide for this on certain crushers by installing a water-cooling coil in the oil chamber itself. As a result, not only can the oil in circulation be cooled where necessary, but also, it can be heated in cold weather to facilitate starting.

The Eccentric Sleeve The eccentric sleeve operates wholly or partially in a bath of oil according to the design. Where no oil pressure is involved, the crusher speed is relied upon to induce oil circulation by the oil passing up through the eccentric journal over the brass wearing ring and back through passages to the reservoir beneath the shaft.

Addition of a little fresh oil once or twice a day will enable this simple oiling system to function very satisfactorily, if the reservoir is drained and cleaned regularly.

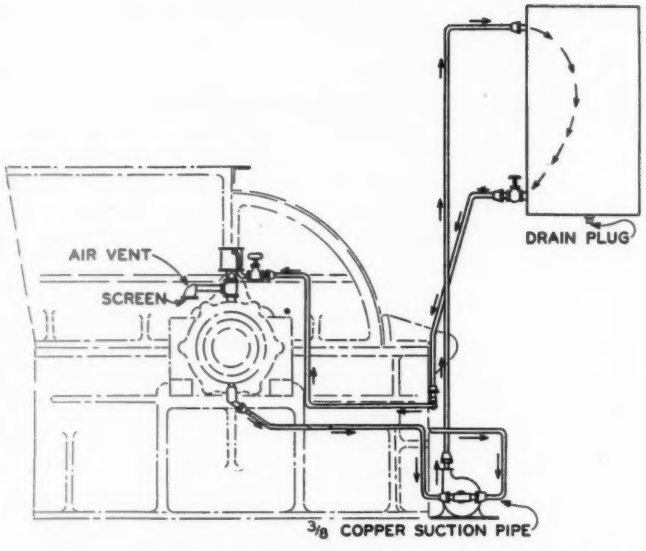
The Lubricant A straight mineral oil of from 90 to 145 second Saybolt Universal viscosity at 210° F. will usually give the best results in average warm weather service. In cold weather, it will be advisable to use an oil of lower viscosity, especially if there is no provision for heating the oil in the system prior to starting, or during operation. Usually a viscosity of from 500 to 750 seconds Saybolt Universal at 100° F. will be best where a lighter oil is required, according to the necessity for lower pour test and greater fluidity, especially on starting.

Top Bearings and Rings Lubrication of the top bearings, suspension and wearing rings within the dust or spider cap at the top of the main shaft of the average gyratory crusher also must be studied. The lubricant must never be so thin as to run pre-

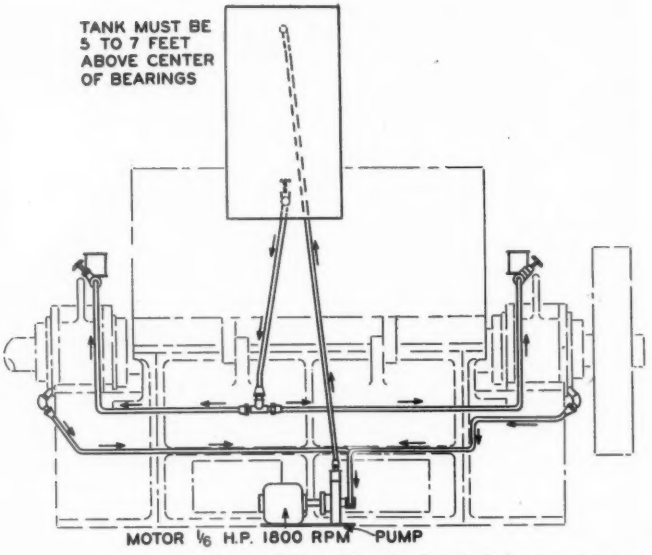


Courtesy of Vulcan Iron Works

Fig. 5. The Vulcan 1-inch by 12½-foot self-oiling single-roller bearing assembly, showing oil distribution by the oil wheel, which is attached to the revolving shaft. This wheel dips into the oil cellar, to carry oil to the top in the pockets, where it discharges it on one side to a trough. From this point it is distributed over the shaft and the surface of the end thrust disc.



Courtesy of Gruendler Crusher & Pulverizer Company



Courtesy of Gruendler Crusher & Pulverizer Company

Fig. 6. Left: The circulating oiling system (motor-driven) for a Gruendler heavy-duty hammermill, end elevation. Fig. 7. Right: Side elevation.

maturely through the bearings as this would leave their surfaces susceptible to excessive friction and wear. As a general rule, crusher oil can be used for such service or a cup grease of around No. 2 N.L.G.I.* worked penetration range.

Tube Mills

Tube mills are especially adaptable for final grinding due to the highly uniform product they can produce. Mills of this type may be known as ball, tube, or compartment mills, according to their size and design. The ball mill is essentially a horizontlly revolving steel drum partially filled with steel balls which continually roll to the bottom of the drum, grinding the particles of rock between and beneath them. The tube mill is very similar to the ball mill, although it is larger and is designed for finer grinding. The compartment type of mill, in turn, is a device which combines both the ball and tube mill in one cylinder.

All such mills may present lubrication difficulties because of the great weight borne by the shaft bearings and the fine grit or dust which may gain entry. Every possible precaution is, of course, taken to keep this dust out of the bearings, but it seems to get in somehow, to frequently cause considerable wear.

As a result the main shaft bearings are built large so that the unit loads are not excessive, but in spite of this it is necessary to use a lubricant possessing considerably body to offset reduction in viscosity due to frictional heat. In the larger newer type mills the main bearings are water-cooled.

The pinion shafts of such mills are often carried by ring-oiled bearings. Here a comparatively light bodied oil of from 200 to 300 seconds Saybolt Universal viscosity at 100° F. will normally give satisfactory service. Careful cleaning and periodic relubrication at regular intervals is suggested in the interest of bearing protection.

(To be concluded)

First Panama Cement Plant

(from page 88)

erated by a 150-kw., 230-volt d.-c. motor-generator set. The direct current will be distributed through a d.-c. distribution panel, similar to that used for a.c. in eight circuits corresponding to the uses listed.

The power plant arrangement is such that additional power-generating units for both a.c. and d.c. may be added without interrupting the operation of the existing units.

Water Supply

The plant is located on the bank of the Quebrancha River which, during the wet season (April through November), will supply ample quantities of water for the operation of the plant. However, during the dry season (December through March), the flow in the river decreases, and on some occasions dries up.

In order to supply the plant with water during the dry season, it was necessary to construct a dam approximately three miles upstream from the plant.

The water will be pumped from the small pond to a water tank located on a high hill, in the vicinity of the thickeners, by two Allis-Chalmers 450-g.p.m., Type SSU pumps located in a concrete pumphouse at the edge of the pond. One of these pumps will operate continuously and furnish approximately 75 per cent. of the plant water requirements. The other pump will operate on a float control, and will run only when the water level in the tank is below a predetermined low level. Provision has been made to alternate the duty of the pumps. A third pump has been provided to serve as a spare for either of the other pumps.

In order to conserve water as much as possible during the dry season, the plant water system has been arranged so that all water used in the process will first pass through a Diesel-engine cooling system, and all water which has not been contaminated will be returned to the pond through a system of spray nozzles.

The climate in Panama is humid, even during certain periods of the dry season. This would decrease the evaporative cooling effect of the spray system and cause the temperature of the water in the pond to rise. In order to prevent this spray-pond water temperature from rising to an undesirable point during prolonged periods of high humidity, provision has been made to discharge a portion or all of the hottest water (from the Diesel engines) to a point below the spray-pond dam. The spray-pond level would then be maintained by admitting cool water from the main storage reservoir which would reduce the temperature of the spray pond. During the rainy season, when water is plentiful, all hot water in excess of process requirements, will be discharged below the spray-pond dam.

*National Lubricating Grease Institute.

New Design Features Necessary for Packing Several Kinds of Cement

By W. R. BENDY

IN recent years there has been a great increase in the number of special cements and types of Portland cement. Twenty-five years ago, most cement plants made only one product, standard Portland cement. Today, a plant seldom produces less than three kinds of cement and may produce as many as eight. This has complicated the packing and shipping operations and has rendered obsolete many well designed packing houses which were intended for the efficient handling of a single product.

One cement requires simple installation. A typical packing machine layout of 1920-30 is shown in Fig. 1. Each packer has its own bin of sufficient capacity to operate for an hour or two without refilling. Each bin has a rotary screen to remove trash from the entering cement. A spill conveyor and an elevator is provided for each line of packing machines.

It was common practice to have two packing machines discharging to one reversible belt conveyor. By operating both machines at once, it was possible to load a railroad car at one end of the belt conveyor at the rate of 20 sacks per minute. The belt conveyor was then reversed and a car was loaded at the other end while the first was being moved.

Fig. 1. A typical packing machine layout of 1920-30—a simple type of installation.

Problems arise with several kinds of cement. The advent of more than one kind of cement immediately causes difficulties with the above type of design. One packing machine can be set aside for each special cement, but this means tying up a productive machine for the sake of one product, of which only a small volume may be shipped. The result is interference with the normal functioning of the packing department.

An alternative is to pack the required amount of special cement on one packing machine, then change back to regular cement. An excess of the special cement then remains in the packer bin, which cannot be filled with the exact amount required to fill an order. Since the cement is brought from the silos to the packer bins in strictly one-way conveying equipment, the disposal of the excess cement is a serious problem.

The usual recourse is to pack out the remaining cement into sacks which are stored on the floor for subsequent shipment. This involves double handling, obstructs the floor with sacked cement, and is generally unsatisfactory. The complication of providing special conveying equipment for returning cement to the silos is likewise unattractive.

Types of design for handling several cements. Changes in the design of packing houses are required to meet these new conditions. In general, the revised arrangements fall into two classes:

(1) The single-packer, multiple-bin design, in which several kinds of cement are stored in separate storage bins in close proximity to a single packing machine. Arrangements are made to change quickly from one kind of cement to another.

(2) The independent packer unit arrangement, in which a packing machine is installed as an independent, self-contained unit. A unit is assigned to pack one kind of cement and never packs any other kind.

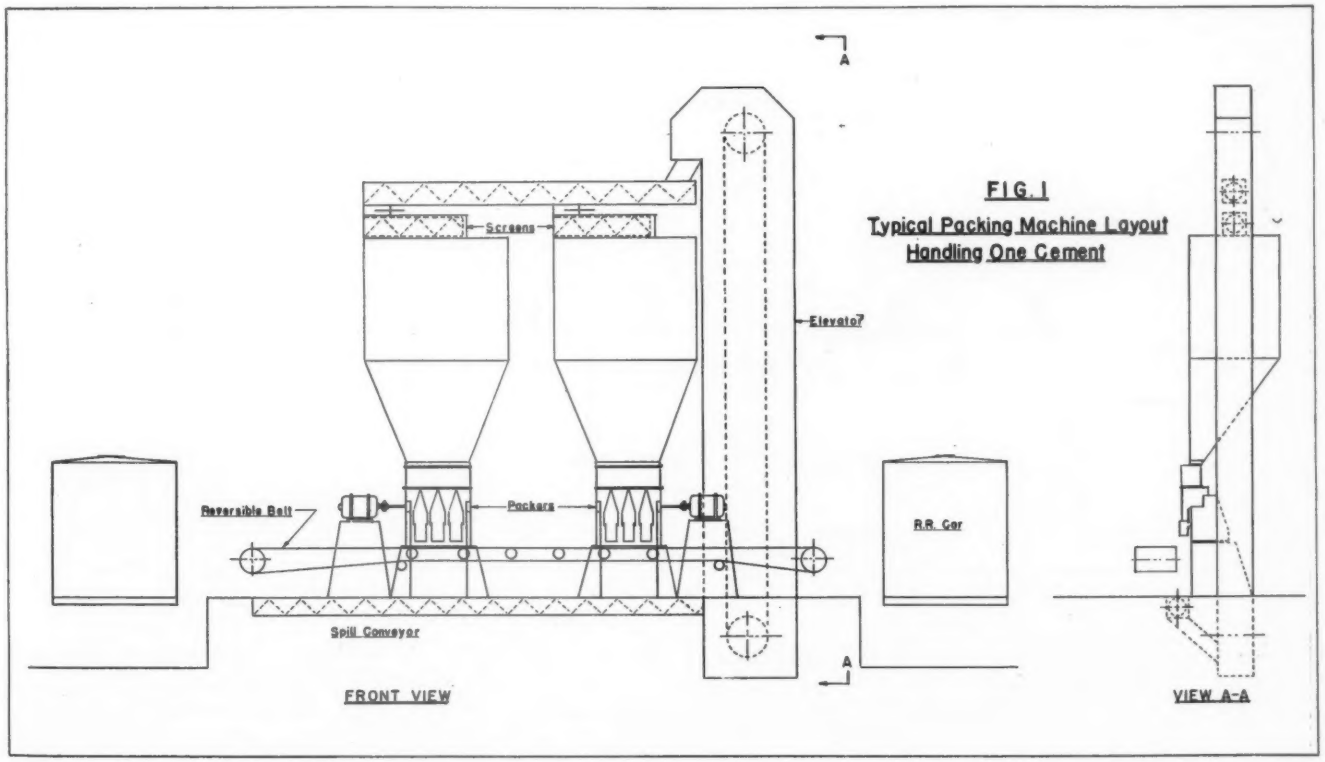


FIG. 1
Typical Packing Machine Layout
Handling One Cement

Single-packer, multiple-bin design. This type of design was developed with the idea of concentrating the packing operation at one point and making provision for rapidly changing the packer from one cement to another. A typical layout is shown in Fig. 2.

The packing machine is provided with a small bin which is kept constantly full by an excess of cement circulating through a screw conveyor above it. Multiple storage bins are provided close to the packing machine, each one holding a different kind of cement and replenished as required from the main silos.

When packing cement "A," the valves are set as follows:

Above packer .....OPEN
Below bin "A" ....OPEN
Above bin "A" ....OPEN

Cement "A" is fed from its bin into the lower screw conveyor, which serves the double purpose of supplying cement to the packer bin and returning to it the cement spilled from the packer. The cement is elevated, screened, and passes into the packer bin, which remains full at all times. Excess cement passes over the top of the packer bin and is returned to bin "A" through the upper screw conveyor.

When it is desired to pack cement "D," the packer bin and the screw conveyors must first be emptied of cement "A." The three valves previously open are now set as follows:

Above packer ..CLOSED
Above bin "A" .OPEN
Below bin "A" .CLOSED

The system is emptied by running cement through the packing machine into the lower conveyor, thence to the elevator, the upper conveyor, and back to bin "A." A simple way of emptying the packer bin is to place ordinary sacks, with the bottoms cut open, on the filling tubes of the packing machine. After the packer bin and the packer are empty, additional time must be allowed for the screw conveyors and elevator to clean themselves of the remaining traces of cement "A." Then the following valve adjustments are made:

Above bin "A" .CLOSED
Above packer ..OPEN
Above bin "D" .OPEN
Below bin "D" ..OPEN

The packing of cement "D" can now proceed.

The chief advantage of this system is that only one packing machine, screen, elevator and spill conveyor are required to handle a number of different cements. The installation is compact and requires a minimum of space. As a result, the capital investment is moderate.

The disadvantages are as follows:

(1) Loss of time. Five or six minutes are required to operate the valves and empty the system when changing from one cement to another. This loss of time is objectionable when handling mixed orders for several kinds of cement shipped in the same car.

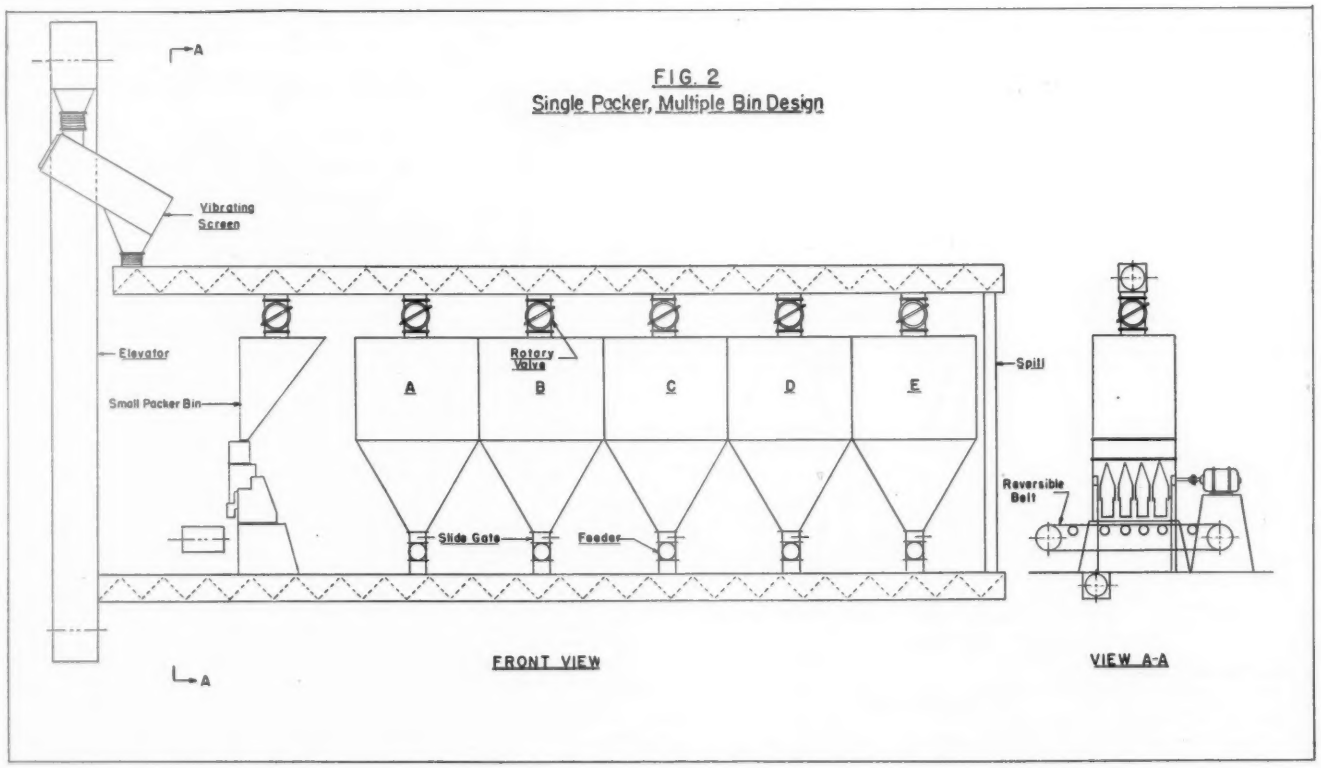
Fig. 2. A typical layout for a single-packer, multiple-bin design.

(2) Chances for mistakes. Two changes of valve positions must be made before emptying the packer bin and four changes after the system has cleaned itself of cement. This allows possibility for errors which may result in the mixing of different kinds of cement.

(3) Contamination. If ample time is allowed for the system to clean itself when changing cements, the amount of contamination of one cement with another is, with one exception, negligible. The exception occurs with water-repellent cements, of which even the slightest trace is highly objectionable in normal Portland cement. For this reason, it is sometimes desirable to modify the true single packing system to the extent of providing a separate packer for water-repellent cements.

(4) Sack handling. It is confusing to supply several kinds of empty sacks to a single packing machine. Mistakes may result in the cement being packed in the wrong sacks.

Independent packer unit design. In this system, shown in Fig. 3, an independent packing unit is allocated to each kind of cement to be handled. Each unit has its own screen, spill elevator, and large bin above the packing machine. The latest practice is to provide a small auxiliary bin between the large bin and the packer. A rotary feeder



feeds cement from the large bin to the auxiliary bin. The level of the cement in the latter is maintained between set limits by mean of level switches which stop and start the feeder as the level rises and falls. This device maintains a substantial constant head of material over the packer and improves the steadiness of operation.

The independent packing machines are arranged in line and deliver filled sacks to reversible belt conveyors. Only one packing machine should operate at a time, depending on which kind of cement is needed. Whenever an order is received, the operator goes to the appropriate machine and packs the required number of sacks.

This system allows a very rapid change from one cement to another without chances for mistakes or contamination. The proper sacks are stored close to the packer on which they are to be used, thus avoiding mistakes.

If there is at least one packer to spare (for example, five packers for four kinds of cement) somewhat greater flexibility may be obtained by dividing the long belt conveyor into two or more reversible sections, One kind of cement, of which a large volume is to be shipped, may be placed in two packers, one at each end of the line, and can then be loaded simultaneously in both directions, using two packing crews.

Fig. 3. System allocating an independent packing unit for each kind of cement to be packed.

Individual cross belts for each packer are sometimes preferred because they tend to give cleaner sacks. By making them reversible, so as to deliver to either of two long reversible belt conveyors, it is also possible to load consecutively at four loading points instead of two. This halves the frequency of car shifting.

The disadvantages of this system are:

(1) There is a large capital investment in packing machines, each one of which operates only a small part of the time.
(2) Considerably more floor and building space is required.
(3) In spite of the large number of packers installed, this system has the effective output of only one machine. This disadvantage may be reduced to a limited extent by using divided belt conveyors.

The disadvantages listed above are all related to the cost of the original installation. From the standpoint of operating efficiency, the system has a number of advantages compared with the multiple-bin, single-packer design.

1945 U. S. Baryte Output Makes All-Time Record

More baryte was produced in the United States in 1945 than during any previous year, according to producers reports to the U. S. Bureau of Mines. Output of primary baryte reached 690,152 short tons, 34 per cent. greater than the previous record year, 1944. Arkansas accounted for the greatest production, 260,662 tons, and Missouri followed with 221,038 tons. The tremendous demand for baryte in weighting rotary oil well drilling muds stimulated the completion of new capacity in 1945, especially in Arkansas and Missouri. Shipments of ground baryte to well drillers reached the record total of 413,620 short tons, about three times average prewar shipment.

Primary baryte includes and is limited to ground baryte produced at El Portal, Calif., flotation baryte produced at Malvern, Ark., and Cartersville, Ga.; and all crude, lump, and pebble baryte produced in the United States except a very small amount of hand-mined material not included in the canvass. The term primary baryte is intended to encompass production of all baryte regardless of the form in which it is marketed, but is intended to exclude as a duplication any ground or crushed baryte which has already been included as lump material.

Improvement Plan Told by Columbia Quarry Company

In launching a $750,000 improvement program, the Columbia Quarry Company of St. Louis, Missouri, recently ordered the first of three 3½-cubic-yard Diesel shovels for its plant at Krause, Illinois. At this plant the company also is installing a 750-850-horsepower, supercharged Diesel engine (National Supply Company).

The first of two 1½-cubic-yard shovels was ordered for the plant at Prairie du Rocher, Illinois. At Valmeyer, Illinois, a 400-horsepower National Supply Company Diesel engine is to be installed.

In addition to the plants at Krause, Valmeyer and Prairie du Rocher in Illinois, the company operates a quarry at Elsberry, Missouri.

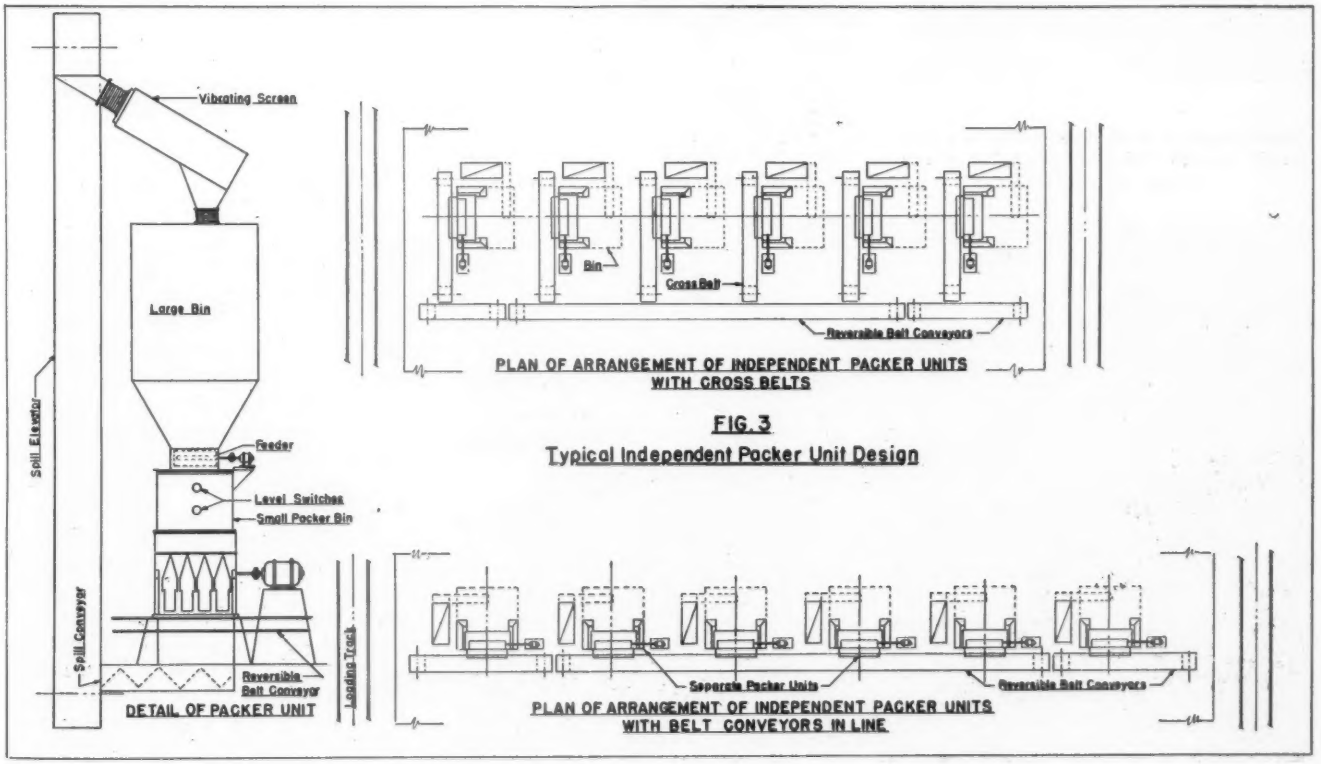


FIG. 3
Typical Independent Packer Unit Design

Penn.-Dixie Completes $500,000 Improvement Program at Clinchfield

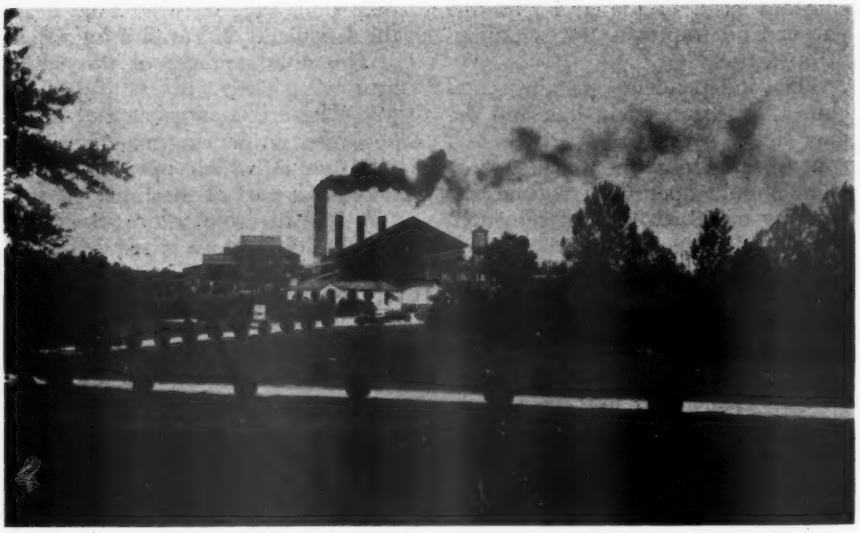
another ON THE SPOT report

WITH the anticipated huge post-war demand for Portland cement already materializing in many sections of the country, the Pennsylvania-Dixie Cement Corporation has grasped time by the forelock with the completion of a $500,000 improvement program at its Clinchfield, Georgia, plant. The installation includes unit coal mills, clinker coolers, closed-type hoods and the most modern controls for each of

By WILLIAM M. AVERY

the three kilns. Designed primarily to increase the efficiency of the plant and to improve clinker quality, the changes have already yielded a bonus in the form of a 10 per cent. increase in production.

One of the important objectives of the program was to reduce the labor, fuel and other costs incidental to the preparation of coal for firing the kilns. The old roll-type mills used for pulverizing coal had been requiring complete overhaul jobs every 8 or 9 months at costs of from $1,200 to $2,000 per mill. In addition, the two rotary driers ahead of the mills consumed coal at the rate of about 10 tons in 24 hours—not in itself an especially high rate of consumption, but rather hard to reconcile with the abundance of heat available at the kilns. Two men were required in the drying and grinding room whenever it was in operation.



Entrance to Penn.-Dixie plant No. 2 at Clinchfield, Ga., is through Miller Park, named for John A. Miller, former president of Pennsylvania-Dixie Cement Corp.

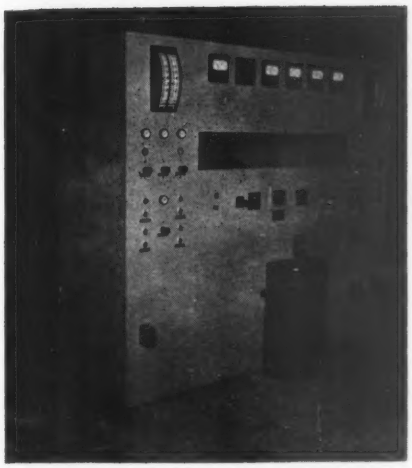
With the completion of the changes at Clinchfield, operation of the old central pulverizing plant has been eliminated altogether. The new coal plant, incorporating three 6-foot diameter by 7-foot long Kennedy-Van Saun air-swept tube mills, is located in a concrete basement between the kiln room and the clinker storage shed. Each mill is fed by a 2-speed Kennedy-Van Saun 36-inch table feeder, controlled by photo-electric cells located in the kiln control cubicles. Three 100-ton overhead steel tanks for raw coal storage make it possible to operate the kilns for as long as 30 hours without loading in coal. The flight conveyors which feed coal to the storage tanks were furnished by Link-Belt.

Hot air is drawn from the kilns, forced through the mills and pumped back to the kilns with coal in suspension, by means of 20-horsepower, 7,000-cubic foot per minute fans in closed circuit. The fans pull across Multiclones set up beside each kiln hood to take out the fine clinker that would otherwise enter the drying and pulverizing circuit. This fine material, which is chuted directly to the conveyor beyond the cooler, is about the size of bird shot, and it accumulates at the rate of approximately 4 cubic feet per 24 hours per kiln.

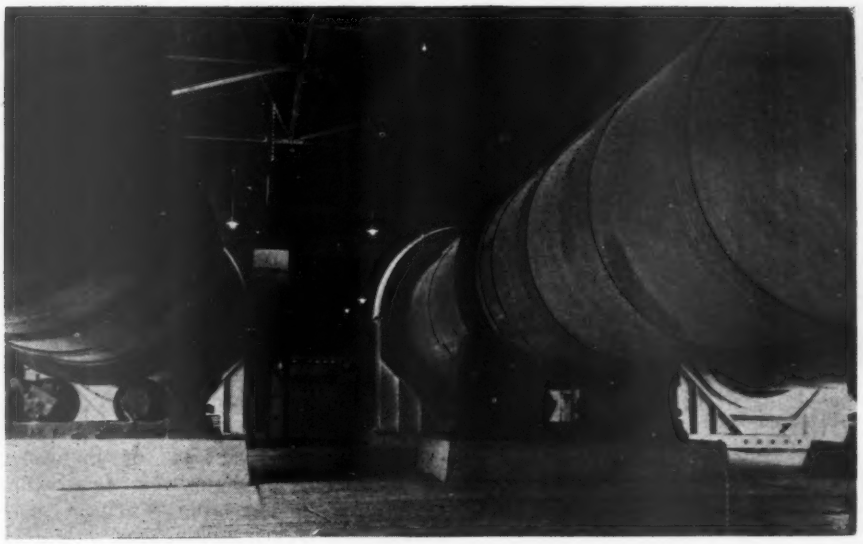
The tube mills are driven by 100-horsepower General Electric across-the-line-type motors. They are charged with 13,000 pounds of 1- and 2-inch balls. After operating the mills for a period of 7 months an addition of 500 pounds of balls per mill was found necessary. The addition is made through a chute at the feeder and requires only a few minutes as compared with the major shut-down that was necessary when replacing parts in the old mills.

With the open-type hoods formerly used at Clinchfield, burning necessarily took place at some distance back in the kilns. The new closed type brings the burning zone closer to the nose of the kiln, effecting some improvement in the quality of the clinker and increasing production from 1,000 barrels per kiln

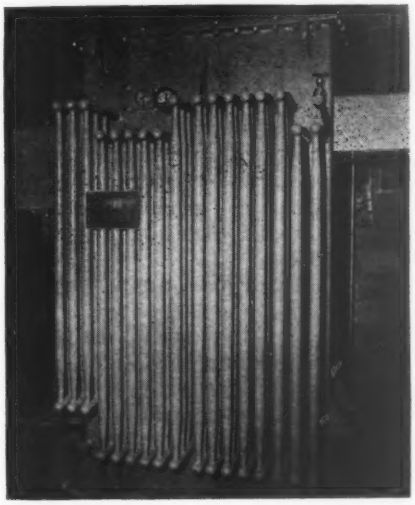
Flight conveyor at right feeds the new coal plant, situated between kiln building and clinker storage shed.



The new control cubicles were designed by J. Sorteberg, electrical engineer for Penn.-Dixie. The burner can control the entire operation from the cubicles.

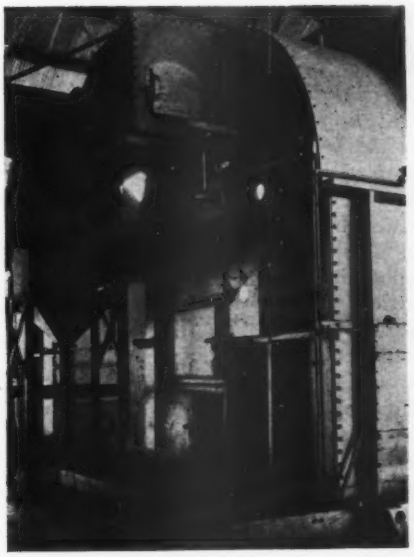


Part of the improvement program involved shortening the three kilns from 175 feet to 166 feet.



Interior of 5- by 20-foot cooler, in which the temperature of clinker is reduced from about 2,700 to 100 degrees F.

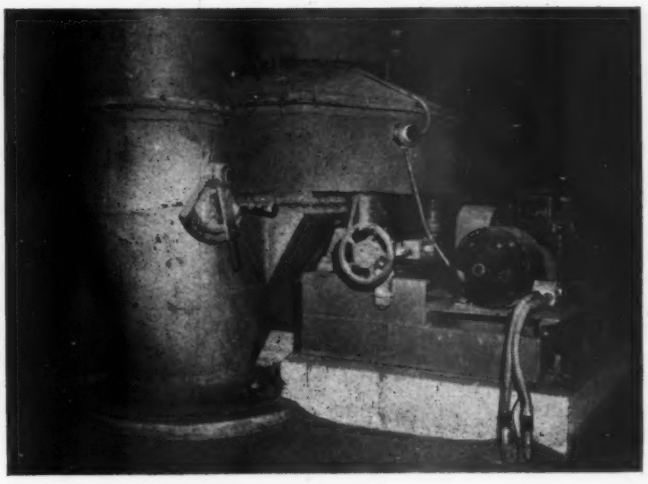
A 750-kv.-a. substation transformer steps current down from 2,300 to 440 volts.

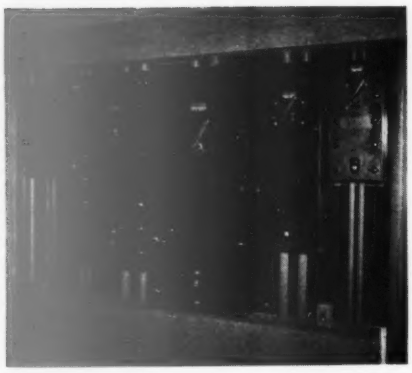


View of the new closed-type kiln end. Fan in pulverizer circuit pulls across dust collector at left to take out fine clinker.

One of the 3-unit coal mills recently installed. This tube mill is 6 feet in diameter and 7 feet long.

The 36-inch table feeders are controlled by photo-electric cells to prevent over-loading coal mills.





Control panel boards are conveniently mounted on wall behind each control cubicle.

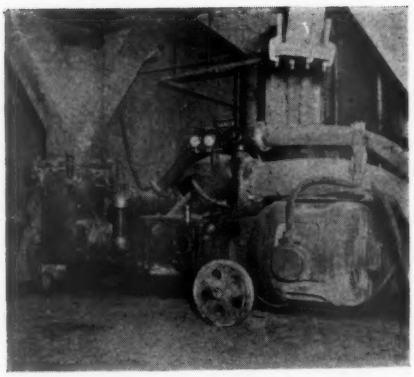
per 24 hours to about 1,100 barrels in spite of the fact that the kilns were shortened from 175 feet to 166 feet.

From the standpoint of quality, one of the most important improvements made was the shift from water to air-quenched clinker. The superior grindability of air-quenched clinker is generally conceded throughout the cement industry today, and its importance has increased with the extremely fine grinding required in the manufacture of modern cements. The new Fuller air-quenching, inclined-grate coolers now in operation at the Clinchfield plant receive the clinker at temperatures varying between 2,650 and 2,750 degrees F. In a distance of only 20 feet the temperature is reduced to about 100 degrees F. Forty-horsepower, 1200-r.p.m. fans draw air through the 5- by 20-foot coolers, and the air-quenched clinker is elevated and discharged into the adjacent storage shed. Three distinctly different grades of clinker are burned at this mill—Type 1 for regular Portland cement, Type 2 for low-heat cement and Type 3 for high-early-strength cement.

The three new control cubicles in the kiln room were designed by J. Sorteberg, electrical engineer for Penn.-Dixie. They place the entire operation, from coal conveyors and tube mills to kilns, coolers and clinker conveyors, at the finger tips of the burner. These control cubicles contain the instruments for the automatic control of the temperature of the coal and air mixture delivered to the kilns, the temperature of the air going to the coal mills, the speed of the clinker coolers and the draft on the kilns. The kiln draft is regulated from the discharge end of the kiln instead of the common practice of depending on the draft at the feed end. In this way the draft is independent of the changing conditions inside of the kiln such as are caused by heavy soaking, formation of clinker rings, etc. In addition to the photo-electric control of the coal mill feeders, the fans, mills and feeders are interlocked so that they must be started in that sequence. Cutler-Hammer controls are used throughout. Although no additional power was necessitated by the new equipment installations, a new 750-kv.-a.-General Electric unit substation transformer was put in during the shutdown to step down from 2,300 to 440 volts.

Other work accomplished recently includes the erection of four new 12,500-barrel silos and the installation of a Fuller-Kinyon Type D conveying system for blending operations and pumping from the new silos. The latter is a newly developed 8-inch portable unit which operates in a tunnel under the storage silos. It is capable of pumping 400 barrels per hour. No major changes have been made in either the raw- or finished-grinding departments.

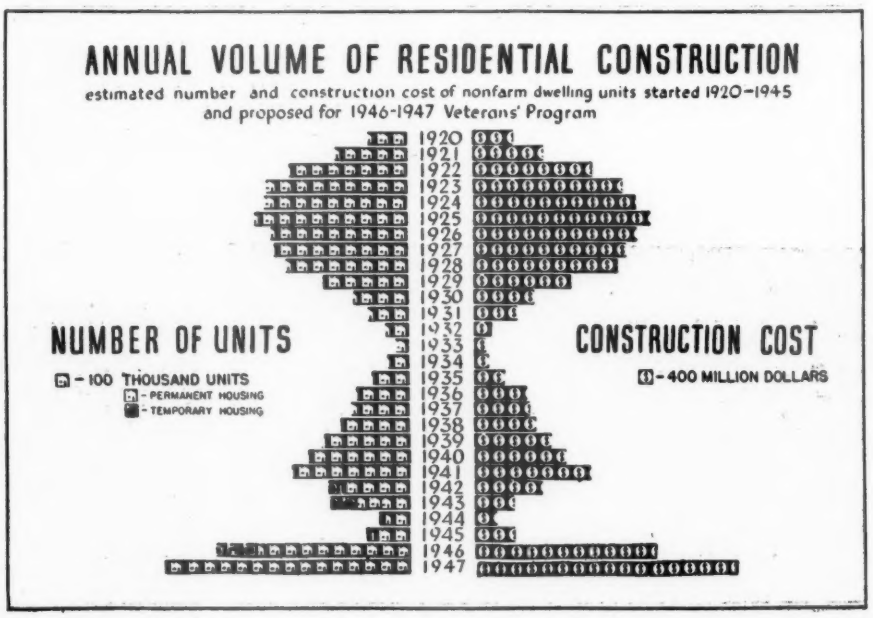
In order to maintain production and shipments during the construction period, a considerable quantity of clinker was accumulated before the kilns were shut down. The storage shed was filled to capacity and some clinker was stored in the open. By running the exposed clinker through the old coal driers, it was possible to maintain reasonably full grinding operations throughout the major portion of the shutdown, which extended from September, 1944, to September, 1945. The plant has been on a 3-shift basis continuously since operations were resumed in an effort to accumulate a supply of finished cement in the storage silos.



Conveying system installed in tunnel under four new 12,500-barrel storage silos.

The installation of unit coal mills and clinker coolers at Clinchfield is similar in most respects to improvements made five years ago at Penn.-Dixie's Nazareth, Pennsylvania, plant. These were described in the July, 1942, issue of PIT AND QUARRY. An almost identical program is also in progress at the company's Richard City, Tennessee, plant, where kiln operations will be resumed early this summer.

C. E. Hardy, Nazareth, Pennsylvania, chief engineer for Penn.-Dixie, has had charge of the design of the various additions and improvements. M. L. Silcox is superintendent at Clinchfield.



A graphic presentation of American home building activity since 1920, showing N.H.A. Chief Wilson W. Wyatt's proposed goal of a 350 per cent. increase for 1946 and an additional 70 per cent. rise over this year's level for 1947. These are the goals outlined for the Veterans' Emergency Housing Program, which calls for a total of 1,200,000 homes to be started in 1946 and 1,500,000 permanent homes in 1947. The chart portrays residential construction only. The 1946-47 program calls for an expenditure of $10,500,000,000 for home construction.

Unique Safety Plan at Marquette Plants Cuts Accidents to Minimum

another P.Q. AND exclusive

IF you were to ask the Marquette Cement Manufacturing Company how it has achieved its enviable record of safety in operations at its plants and quarries scattered throughout the Mississippi Valley, you could be given no startling cure-all formula. Marquette's achievement in safety measures is epitomized by a still-mounting record of more than three million consecutive man-hours of accident-free operation at its Cape Girardeau, Missouri, plant and attested by numerous safety awards and trophies on display at its other plants in Iowa, Illinois and Tennessee. But all have been achieved on the basic premise that to be efficient to the greatest degree, a safety program must be custom-tailored to the individual plant.

Many years of experience in these matters have convinced the men at Marquette who are responsible for its safety in operations—Secretary-Treasurer V. J. Hanley and the plant safety engineers who are under his direction—that the human element is here again all-important, not only in the end result but also in effecting that end. It is their experience that safety measures which are hugely successful in one locality may fall flat in another. This is attributed largely to the sectionally varying temperaments and attitudes on the part of men exposed to the same program under the same conditions.

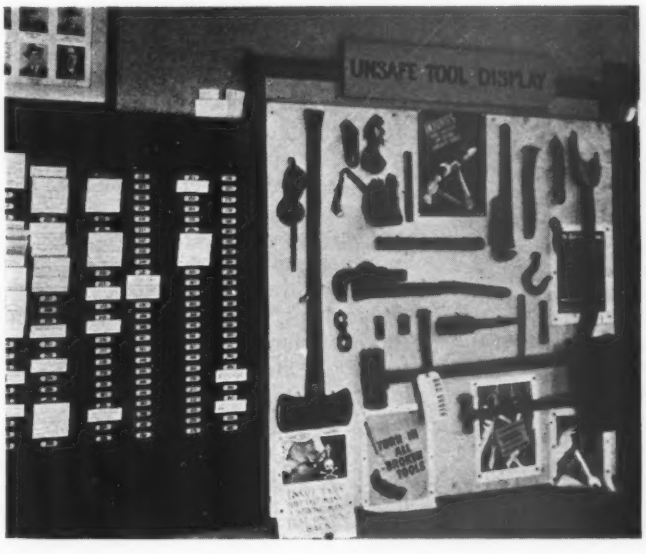
For example, the safety court idea, whereby violators of safety regulations are "arrested" by plant safety police (elected by and from the men), tried in the plant's safety court and, if found guilty, given some form of inexpensive but impressive sentence, was inaugurated some 15 years ago by M. P. Greer, then safety engineer at Marquette's Cape Girardeau plant. There it has continuously operated with huge success, the annual election of a new chief of safety police being one of the events of the year there. It has functioned on a highly democratic level and sentences are accepted in the spirit in which they are given. At one time or another W. A. Wecker, president of Marquette and the chairman of the company's board of directors, as well as the office porter, have been tried and sentenced in this open safety court. Nevertheless, the same idea tried at its other plants has not worked out satisfactorily, primarily because of a different attitude on the part of the men which could not be effectively overcome. The psychology of presentation is, of course, a factor: whereas in the first case it was an original "game," now traditional, elsewhere it may be regarded as an importation, therefore to be regarded with skepticism and suspicion.

For this reason, every effort is made to have the safety program, general and detailed, at each plant emanate from the men themselves, with only the most essential minimum of supervision and direction from the poop deck—but with the finest example and keenest appreciation from that quarter. Some of the company's most successful safety measures have been suggested by rookies or men in the lowest wage-scale. But any unpolished plan of action coming from a meeting of the minds of the *men most concerned* (once they have been educated to that view) is far more efficacious in net result than the most brilliant gem of a program packaged for delivery to them. That is the foundation of the Marquette safety program—that and, of course, continuing alertness to keep all potential sources of personal injury physically guarded: to keep plugged by the most effective means all chinks in the armor surrounding dangerous machines or areas.

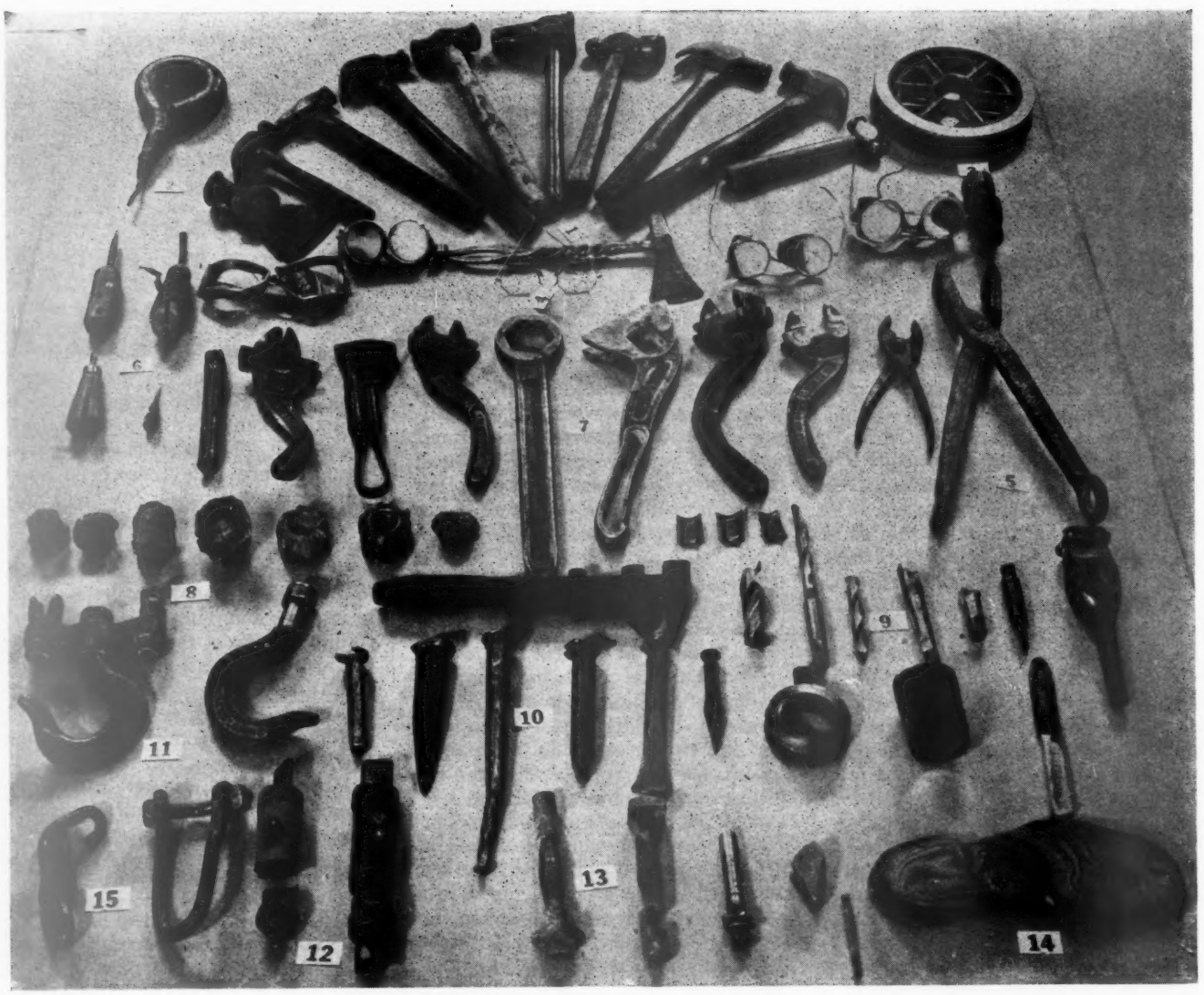
Upon this is erected a skeleton framework common to all plants and consisting of the following elements:

I. Executive—Company top officials in informal board, usually consisting of the president, vice-presidents, general superintendent, safety director (secretary-treasurer), manager of labor relations, and director of public relations; these men formulate basic policies and receive monthly reports of activities and progress from all plant safety engineers.

II. Operative—
   A. Plant superintendent, who *actively* participates in *all* plant safety activities.
   B. Safety engineer, who is the real local sparkplug; under his di-



Below, left: The unsafe tool exhibit at Marquette's Cape Girardeau, Missouri, plant is prominently displayed as a safety reminder to all employees. Right: A typical "sentence" meted out by a Marquette safety court to a violator of safety rules. He must wear these signs and bandages in the plant for a specified period.



A collection of unsafe implements and gear made by E. W. Fitzgerald, safety engineer at the Oglesby, Ill., plant of the Marquette Cement Manufacturing Co., where it is now a permanent exhibit after having been on display at safety conventions throughout the United States.

rection and nominal guidance come:

1. *Foremen's Safety Committee* (permanent membership) to which all foremen belong and which meets once each month for planning and discussion of safety matters.
2. *Workmen's Safety Committee* (personnel rotated) which meets weekly, with representatives from each department of the plant. At least one foreman is appointed to attend and takes an active part in the general discussion of the causes of any accidents, close calls, unsafe conditions, etc. Safety slide films are used as often as possible. Superintendent usually acts as chairman, safety engineer acts as secretary and keeps minutes of each meeting which are read and discussed at the following meeting.
3. *Department Safety Meetings* are held weekly between the general meetings of the above safety committee; it is usually conducted by foreman although department workmen are encouraged to, and often do, volunteer for this duty. Minutes are kept and read at general meetings to facilitate exchange of ideas.
4. *Special Sub - Committees:* Safety Rules, Goodhousing, First Aid, Tool Inspection, Fire Inspection, June No-Accident Campaign, Social, Accident Investigation, Contests. Personnel of these committees is rotated to get every man on some committee at regular intervals. This makes for better morale and dissemination of knowledge.

All Marquette foremen are regularly instructed in safety and trained as safety instructors, as they are expected to train all men under their supervision.

Whenever a new man is employed he is first interviewed in friendly fashion by the employment manager, then physically examined by the company doctor and, of equal importance, spends time in discussion of safety matters with the plant safety engineer. During this talk the new man is given the personal slant on the advantages to him of company recreational facilities, group insurance, etc., is indoctrinated with the company's tradition of safety in operations, and is given, and encouraged to familiarize himself with, a booklet containing the plant safety rules and regulations. He is then introduced to his foreman for detailed job training.

These safety rules and regulations in the possession of each man, and posted on the bulletin boards in each department, are largely drawn up by the men themselves (Rules Committee work) after detailed research and every assistance by the safety engineer. Before any new rule becomes official, or an old rule is changed, it must be approved by both the Workmen's and Foremen's General Safety Committee at that particular

Marquette plant. This method, it has been found, makes for better understanding and cooperation in its enforcement.

A representative list of such rules now enforced at one Marquette plant having an outstandingly low accident rate follows:

GENERAL SAFETY RULE: Employees are not required to perform any hazardous work or expose themselves to any danger when they know a hazard is involved.

FIRST AID RULE: All injuries, no matter how slight, must be reported immediately for first-aid treatment.

Rule 1. Ride in a safe position. Employees are not permitted to ride on the running-board, fenders or on the outside of any car or truck in an unsafe manner or allow others to ride on the running-board, fenders or on the outside of any car or truck in an unsafe manner, while on the premises of this company.

Rule 2. Make a full and complete stop at all boulevard "Stop" signs which are now posted and at those which may be posted about our plant. Observe the speed limit signs and other traffic signs which are now or may be erected. It is necessary that all cars and trucks come to a complete STOP at the Frisco main-line crossing when the Wig-Wag signal is operating. If *definitely* determined that the Frisco switch-engine operating in our yards is cause of signal operating, then proceed across main-line tracks. Drivers are required to obey the directions of railroad crew members who guard crossing while switching is being done over our plant driveway.

Rule 3. Stay out from under suspended loads. Employees are not permitted to drive, walk, run, stand or work under the buckets or suspended loads of cranes, shovels, derricks, etc. Employees may pass under the foot or lower end of booms if their work makes it necessary to do so and then extreme caution must be used. At no time shall employees lean against, sit, stand or ride on beds of cranes. Crane or shovel operators shall not swing loaded or empty bucket or other suspended load over men who may be working or standing below.

Rule 4. Drive carefully. Employees and others must not drive in a careless or reckless manner or at a rate of speed faster than 25 miles per hour at any time in the mill, mill yard, quarry or quarry yard.

Rule 5. Park only in an authorized parking area. Employees must not park cars, trucks or other vehicles in places where there is danger to persons or property.

Rule 6. Keep fire away from explosive materials. Employees shall not have lighted pipes, cigars, cigarettes nor light matches or automatic lighters close to any gasoline can, tank or pump nor around or in dust collector in coal-grinding department, nor in bag room, oil house, dynamite storage or cap house or while handling, unloading, hauling or using dynamite or caps. Where certain work in the coal-grinding department or in the bag room requires the use of burning apparatus or blow torch, this equipment may be used but special precaution to prevent fires must be taken.

Rule 7. Stay out of the danger zone during blasting. Employees shall not drive or walk out of the mill yard nor leave the quarry yards after the second series of three whistles are blown just before a blast is fired in the quarry. Employees are not permitted to sit in autos or trucks at quarry parking grounds or in quarry yard during a blast and must not leave cover before the TWO "Return to work" whistles are blown following a blast. Employees in gardens must retire to safe distance from quarry when first warning signals are blown. (Mill yard, as referred to in second line of this rule, is defined as the area East of the river dock track, the first railroad track encountered when driving to highway.)

Rule 8. Adjust couplings while cars are at a standstill. Never use the feet to kick or adjust the couplers on railroad cars while either coupling is in motion. A stock or pin must be used to insert link in link-and-pin clay-car couplings.

Rule 9. Stay clear of rolling equipment. Employees are not permitted to crawl, hop or jump on or off of moving railroad cars, clay cars, rock cars or other traveling equipment, unless their regular duties requires same, nor are employees permitted to ride in or on the above mentioned equipment in an unsafe position. Also employees are not permitted to hold or hitch onto or walk behind skip cars on quarry incline.

Rule 10. Take your time. Never crawl, climb or in any manner go under railroad cars, clay cars, rock cars or cars of any description. Never go under or over couplings or go across in front of, under or over moving cars or go between the couplings on cars that are standing uncoupled but too close together for safe passageway.

Rule 11. Leave electrical work to the electricians. All other employees, unless authorized in writing to do so by their foreman and the chief electrician, shall not repair, adjust, connect or tamper in any way with electrical equipment.

Rule 12. Handle electric cables carefully. Never handle power cables or other electric cables with power on same without using special insulated hooks or rubber gloves provided for same. At no time shall power cables to quarry shovels or well drills be handled by hand, while the power is on.

Rule 13. Avoid leaving bare places or ends on electrical wiring. Employees must not leave any electrical wiring or equipment in an unsafe condition.

Rule 14. SAFETY TAG RULE. Before an employee starts to work on any machinery, boiler, electrical circuit or other equipment which may be started unexpectedly while the work is being done, he must contact the operator and explain what work is to be done. The operator will then shut down the equipment, pull the switch, open the switch box and make sure all switch blades are clear of contact clips, and then place his safety tag on the switch handle.

Then all men working on the equipment must place their own safety tags on the same switch handle or control, before going to work on the job.

As each man completes his part of the job or leaves for some other job or at the end of his shift, he must go to the switch or control and remove his tag only. After all tags have been removed, leaving only the operator's tag, and he has made sure that everyone is in the clear, he may then start the equipment.

EXCEPTIONS: Safety tags need not be used when changing mix feeder chains in kiln room as long as operator stands at switch while change is being made.

Since there are no operators in cement bridge and over silos on 1st and 2nd shifts, repairmen are authorized to shut down and start up equipment in those places by following the same procedure outlined above for operators to follow when shutting down or starting up.

Rule 15. Be sure to replace all safeguards. All guards, guard rails and covers removed from any equipment, including floor openings, pits, manholes, stairs and platforms, must be replaced before completing the job.

Rule 16. Shut down machinery, pull switch and use safety tag as outlined in Rule No. 14 before putting on belts. All equipment must be shut down to put on belts except small feed belts may be put on tube and Fuller mills while running.

Rule 17. Riding on or stepping over moving equipment is prohibited. Employees are not permitted to ride on any belt, conveyor or drag or to cross over, other than on steps provided, any conveyor, shaft, coupling or other exposed running equipment.

Rule 18. Goggles must be worn at all times when there is danger to the eyes. Safety goggles must be worn when chipping cast iron, brass, copper, aluminum, babbit, concrete, brick or any other material that is liable to cause injuries to to the eyes, except chipping brick inside of kilns, dryers and dryer furnaces is permitted without goggles. Screen-type goggle is recommended for use while chipping brick in the places just mentioned. Safety goggles must also be worn when breaking concrete or rock and when pouring or skimming babbit, lead, zinc, solder or other hot materials.

Rule 19. Proper burning goggles must be worn to protect the eyes. Burning goggles must be worn when burning, heating, cutting or welding with an acetylene torch and proper shield or hood must be used or worn when using electric arc welder. Also man operating electric arc must see that the arc is properly enclosed with a canvas shield unless the location of the job makes this impossible; then men working nearby must be warned by the operator to wear dark glasses or stay completely away from the flare of the arc Also helpers on electric arc welding jobs are required to wear protective dark glasses or turn their back to operation and protect their eyes from the dangerous rays.

Rule 20. Protect the eyes when operating grinding equipment. Men operat-

Left: E. W. Fitzgerald, safety engineer, Marquette plant at Oglesby, Ill. Above: Anderson Hayden, safety engineer at the Cape Girardeau plant, inspecting the plant's P.C.A. award, to which is now being added "1945." There have been no lost-time accidents at this plant since June, 1941, which represents approximately 3,000,000 continuous man-hours of safe work. Right: James C. Griffin, safety engineer at the Marquette plant in Des Moines, Ia.

ing emery wheels, portable grinders or other high-speed grinding equipment, that have no fixed glass guards must wear safety goggles. Glass shields must be used when operating grinding equipment with glass guards permanently attached.

Rule 21. Protect the eyes when using compressed air. Employees must wear proper goggles when drilling or reaming cast iron with air motor and when blowing out electric motors. Safety goggles must be worn at all times when compressed air is used in a place or location which will cause particles to be blown in such a manner as to be dangerous to the eyes.

Rule 22. Use only safe tools. Employees are not permitted to use or to have in their possession any unsafe tool or piece of equipment, unless for repair. Also employees are not permitted to use any tool or equipment for regular use or for repair, for a purpose for which it was not designed, if in so doing it creates a hazard. Repairs for most tools can be handled at tool-room, blacksmith or carpenter shops.

Rule 23. Go under clay mill incline instead of across tracks. Employees are not permitted to walk, run or in any manner cross clay mill tracks at foot of incline to clay mill, except clay mill employees may cross when their work makes it necessary to do so. Crossing these tracks between incline and point of clay track switch, which is indicated by posted signs, is considered dangerous and is a violation of this rule.

Rule 24. Make sure that electrical equipment is properly grounded. Employees operating electric shovels, well drills, arc welders, portable electric tools or any other electric equipment requiring a ground connection, must see that same is properly grounded before starting work.

Rule 25. "Horseplay" will not be tolerated. Employees must not engage in what is commonly known as "horseplay", scuffling, throwing materials, "goosing", running and chasing or playing tricks or pranks on anyone while on company premises.

Rule 26. Stay out of danger zones marked off by safety barricades. Employees must not go under or over wires, ropes or other materials so placed to form a safety barricade and used to mark off certain danger zones, while cleaning roofs and other work where there is danger of falling material, tools, etc.

Rule 27. Wear safety belt and rope to prevent falls from high places. Employees engaged in cleaning or repairing any roof, etc., or ledging rock in a dangerous place must wear proper safety belt and/or rope secured to their person and and also fastened in a safe manner to prevent a fall. Provided that it is permissible to work in valleys between roofs and on very flat roofs where wheelbarrow is used, without belt and rope. Also provided that it is permissible for *trained men* to remove and replace corrugated roofing without having the safety belt or rope secured to their person, but the safety rope must be used when moving about on the roof and must be close at hand at all times. In addition, a safety board must be secured across the roof below where the work is being done.

Rule 28. Foremen are not to ask men to take chances. Foremen or anyone in charge of men shall not ask any employee to do any work which in so doing would cause the employee to jeopardize his own or his fellow workmen's safety or which would cause a violation of these safety rules.

Rule 29. Employees must sign warrant when asked to do so by safety police chief. Employees must not refuse to sign a warrant when requested by the safety chief to do so and must not withhold information relative to a case being investigated by the chief or safety man, nor withhold information during trial in safety court or fail to report to safety chief or safety man any violation of these safety rules noted. Persons involved in "framing" a case to make it appear a safety rule has been violated, are guilty of violation of this rule.

Rule 30. Keep toilets, shower and locker rooms clean. Employees must not throw matches, paper or other foreign material in urinals, and must not leave dirty clothes or other materials on floors and benches in locker or shower rooms. It shall be a violation of this rule to spit on the floor or in any manner to cause an unsanitary or unsafe condition to exist. Employees must drain and rinse wash bowls and flush toilets after using same.

Rule 31. Keep materials off of floors. Employees must not throw or place oil, grease, soap, soap cartons, paper, nails, welding rods, banana peelings or any other substance or material on floors where someone may step on same and be injured.

Rule 32. Be absolutely sure everyone is in the clear before starting machinery. Employees must *always be certain* that everyone is in the clear and out of danger before starting machinery of any kind, before turning on steam on any line and before throwing power on any circuit.

Rule 33. Remove explosive materials from exposed places. Dynamite, dynamite caps and other explosives materials must never be left in exposed places when men work or pass by. Gasoline or other flammable materials must never be placed or left in containers not properly marked showing the contents, nor shall they be used for any cleaning purpose. Fuel oil may be used or carbon tetra-chloride may be secured from the storeroom for use when cleansing machines, motor parts, etc.

Rule 34. Be careful when handling or using gas cylinders. Oxygen and acetylene tanks must be properly secured when in use and must be wired securely together or laid down when not in use. These cylinders must never be left in extremely hot places nor in direct sunlight when not in use. Rough handling, dropping or otherwise mishandling of the cylinders will not be permitted. Two men must be used when carrying acetylene or oxygen cylinders. Protective caps are provided with all cylinders for pro-

(*Continued on page* 112)

Hwa Hsin Cement Plant in Hankow Promises to Be Largest in Far East

By PHILIP CHEN
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Allis-Chalmers Mfg. Co.

WHAT promises to be the largest cement plant in the Far East is now in the process of construction for the Hwa Hsin Cement Co., Hankow, China, and is expected to be in full production by late 1947. Anticipating a tremendous amount of reconstruction work during the post-war period in China, and aware of the inadequate cement supply to meet the immediate demand, the Hwa Hsin company, a leader in China's cement industry throughout the war years, has mapped an expansion plan to increase its present facilities.

As a step in this direction, Paul H. Chang, chief engineer of the Hwa Hsin Company, visited this country about two years ago to purchase a complete new cement plant. In the summer of 1944 a contract was entered into with the Allis-Chalmers Mfg. Co., Milwaukee, Wis., to supply complete machinery for a 1,000-metric-ton-per-day or 6,000-barrel-per-day wet-process cement plant. This marks the first attempt by an American manufacturer to supply complete cement manufacturing machinery to a plant in China. In the past, practically all cement plants in China were designed and built by European concerns.

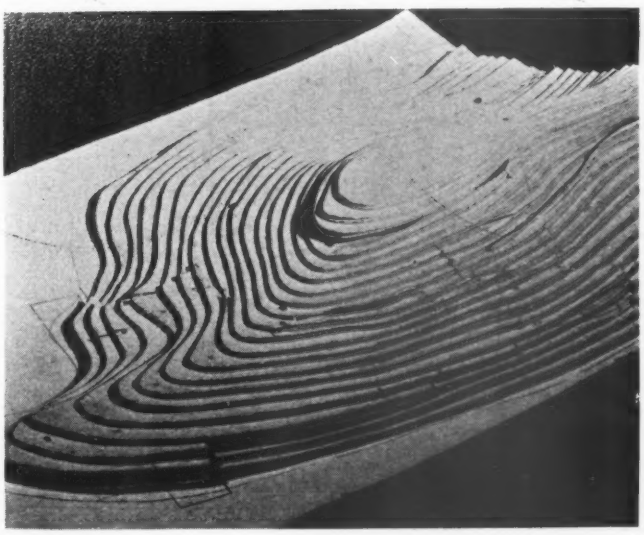
The plant, largest of its kind ever contracted for by Allis-Chalmers, will be strategically located about 90 miles from Hankow along the great Yangtze River, so as to be in a position to supply all markets along the Yangtze Valley, including such important ports as Hankow, Chungking and Shanghai. Transportation facilities at the plant site are excellent. Beside being able to utilize the full advantage of river transportation, it is also situated near an important terminal point of the Peiping-Canton Railway.

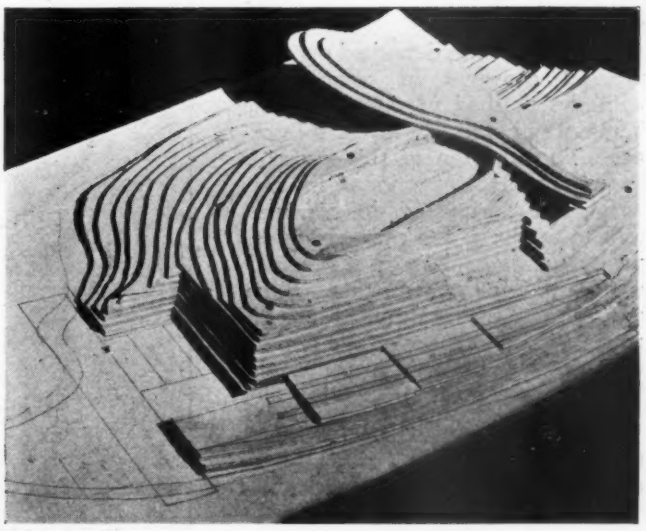
A semi-bituminous coal mine located next to the plant site is available for a handy fuel supply. Since the heat value of the coal is comparatively low and the ash content quite high, it is often necessary to prepare a much higher lime content in the raw mix, so as to compensate for the coal ash produced in kiln combustion. However, since the cost of transportation for this low-grade coal is practically nil, it is fully justified to use this type of fuel for kiln-burning operations.

Both argillaceous limestone and pure limestone are abundant near the plant site. The argillaceous limestone, which contains approximately 80 per cent. $CaCO_3$, is similar to the famous Lehigh Valley cement rock in this country in both chemical composition and characteristics. The stone is highly stratified and soft. It generally contains the right composition for making standard Portland cement with very little addition of pure limestone required in order to increase the lime content in the raw mix. The pure limestone is massive, containing approximately 97 per cent. $CaCO_3$. The raw mix generally contains three parts of argillaceous limestone to one part of pure limestone and less than one per cent. of sandy clay which is essentially river bank silt. Samples of the raw material at the plant site which have been submitted to the laboratory for testing indicate chemical compositions as shown in the table below.

The plant capacity of 1,000 metric tons per 24-hour day with the wet process has been accomplished by using two rotary kilns, each having a normal capacity of 500 metric tons per day. The feature of interchangeability of parts has been applied extensively throughout the plant design, so as to insure great savings in repair parts. This feature is especially noticeable in both the raw material and clinker grinding departments, where all the mills and

	Sample 1 Argillaceous Limestone	Sample 2 Pure Limestone	Sample 3 Sandy Clay
SiO_2	11.38 per cent.	0.72 per cent.	60.02 per cent.
R_2O_3	5.62	0.56	19.34
CaO	43.57	54.20	4.95
Ignition Loss	36.47	43.11	.....
$CaCO_3$	80.04	97.31	.....





Below, left: Contour model of Hwa Hsin Tiger Hill plant site. Right: Model showing proposed cut at Tiger Hill plant site.

their driving units are identical. The general design of the plant by departments is described in the following paragraphs.

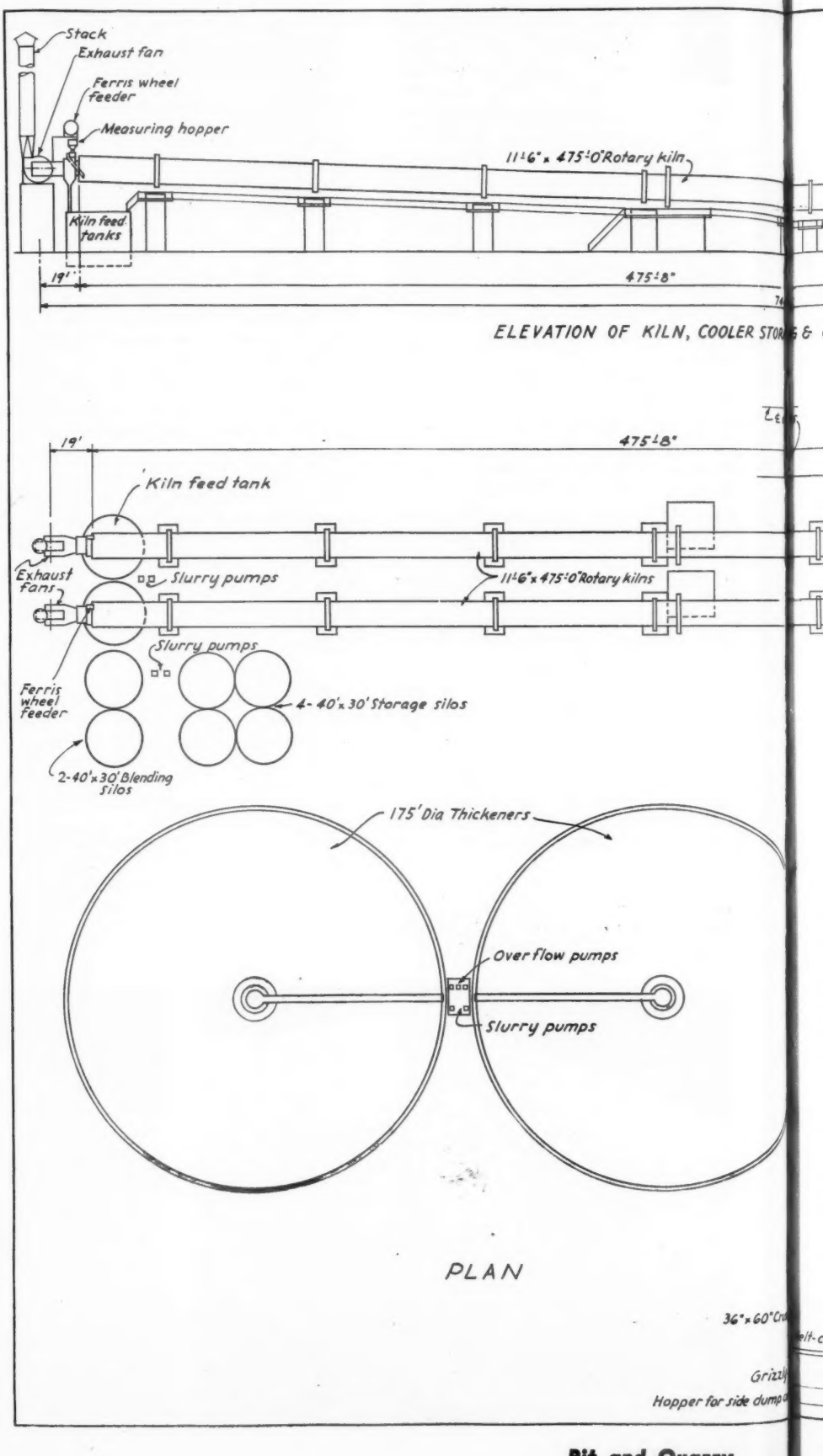
Crushing Department The crushing plant is designed for eight-hour-per-day, six-day-per-week operation. This capacity will be sufficient to supply crushed raw materials to the plant for 24 hours per day, seven days per week. The average hourly production from the crushing plant is approximately 248 metric tons per hour with the maximum size of feed at 26 in. and a final product of minus ¾ in. Both the pure and the argillaceous limestone, after being mixed, are loaded by a 2½-cu.-yd. shovel into side-dump cars and delivered into the crushing plant.

Because the argillaceous limestone to be handled by the crushing plant is highly stratified and soft and because the amount of pure limestone to be handled in the process is very limited, a 36- by 60-in. Style B Fairmount crusher and a No. 5050 Dixie hammermill will be used for primary and secondary crushing, respectively. The crushing plant's flow sheet is as follows:

The quarry-run stone will be dumped from the cars onto a Jeffrey vibrating grizzly feeder. The fine material will fall through the grizzly, by-passing the primary crusher, which will reduce only the oversize material. The product from the primary crusher, after combining with the fines from the grizzly on a common belt conveyor, is then delivered to a 5- by 10-ft. double-deck Ripl-Flo screen which removes the minus ¾ in. material. This screen is equipped with a heavy-duty upper deck with 2-in.-square openings to protect the fine screen surface of the bottom deck from damage by the large stone. The oversize from both decks is deposited into the surge bin for further reduction by the hammermill.

The undersize is deposited onto the product conveyor in combination with the finished product from the hammermill and conveyed to storage. The function of this screen is to remove the fine portion of the material, thus permitting the hammermill to apply its full pulverizing capacity upon the large pieces which require the most reduction. Since quarry stone will be dumped into the primary crusher more or less periodically, flow of material in the crushing circuit would be uneven. In order to maintain efficient operation, a small surge hopper is placed on a feeder ahead of the hammermill to insure uniform flow of stone.

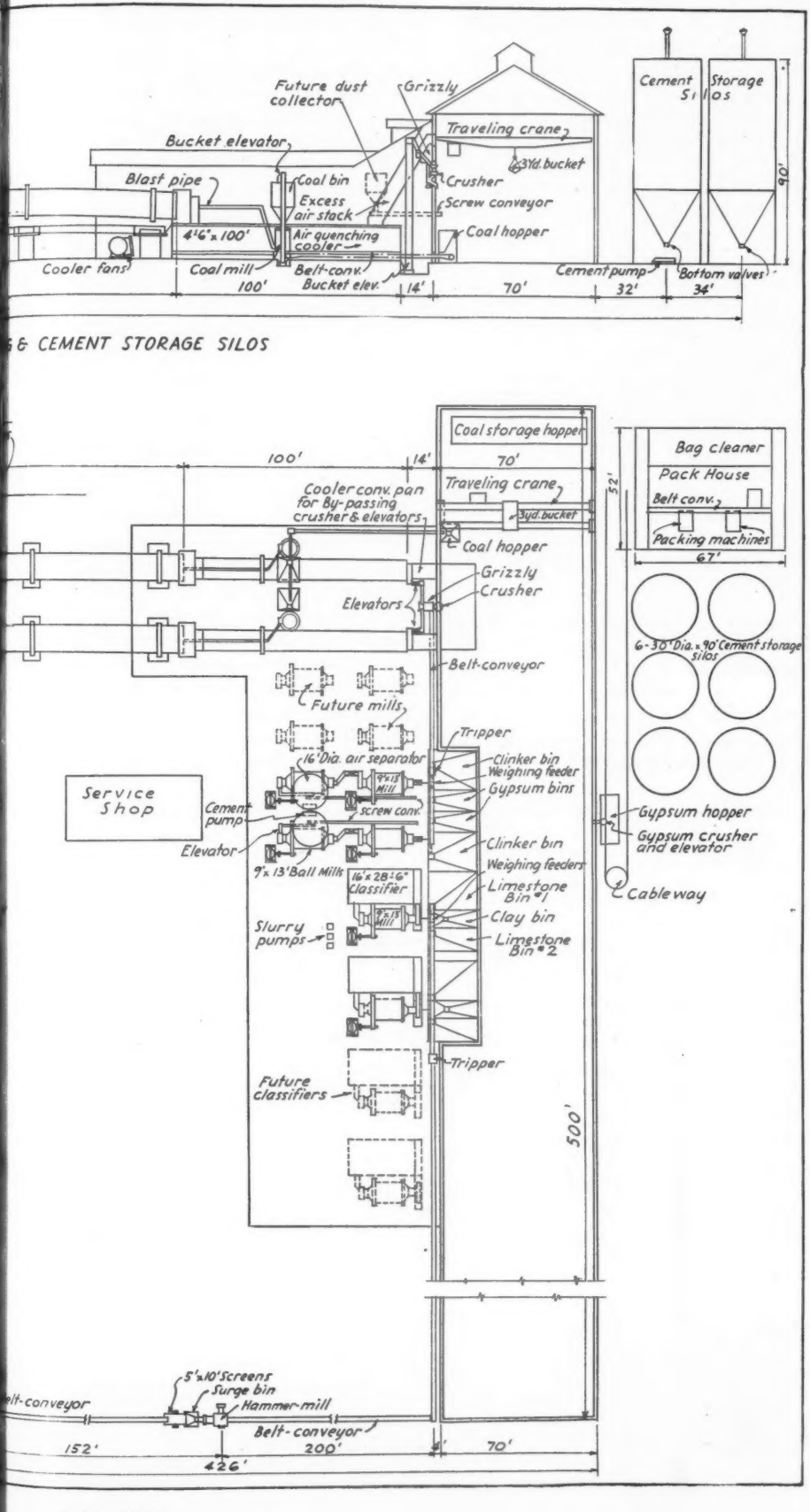
Raw-Grinding Department The raw-grinding department of this plant is designed for two-stage closed-circuit grinding operation. This circuit will consist of two 9- by 13-ft. ball mills, each unit to be driven by a 500-hp. synchronous motor. The primary mill will be closed circuited with a 12-ft. by 30-ft. Type QSFX Dorr rake classifier and the secondary mill will be closed cir-



Plan and elevation of Hwa Hsin plant, including kiln, cooler, storage building and cement-storage silos.

cuited with a 16- by 42- by 28-ft. bowl classifier.

Raw materials from the storage bins are fed through three weighing feeders and water is added as the crushed materials enter the mill. The discharge from the mill is picked up by a sand wheel and elevated to a sufficient height for gravity flow into the rake classifier. The coarser particles settle to the bottom of the classifier and the reciprocating rakes move them up the incline into the feed end of the mill.



The fines from the primary mill discharge overflow from the lower end of the classifier down to a launder into the secondary classifier bowl. This bowl is equipped with rotating rake arms which move the coarse particles as they settle into the center of the bowl, discharging them to the reciprocal rakes, then into a sand wheel, and finally to the feed end of the mill for further reduction.

The finely-ground product overflows the periphery of the bowl as a slurry containing 85 to 87 per cent. water. This slurry flows into a sump beneath the floor, where it is delivered to two 175-ft.-diameter thickeners for dewatering. This mill circuit will have a grinding capacity of 78 tons or 71 metric tons per hour for 24-hour operation with the feed at minus ¾ in. to a fineness of 90-92 per cent. minus 200 mesh. This capacity is based on average operation conditions and data available and cannot be considered conclusive until results have been obtained from actual grinding and settling tests on representative samples of the raw materials available at the plant site. The slurry is dewatered from the thickeners from 85-87 per cent. moisture to approximately 35 per cent. moisture. The clear water from this thickener overflow is returned to the grinding circuit.

Slurry-Blending System The slurry blending and storage system of this plant will consist of four slurry storage tanks, two slurry blending tanks and two kiln feed tanks. The storage and blending tanks are 40 ft. in diameter by 30 ft. deep and the kiln feed tanks are 30 ft. by 30 ft. The combined capacity of these eight tanks will provide sufficient raw slurry storage for five days' continuous operation of the plant.

Slurry is first placed in one of the four slurry tanks, where a chemical analysis is made and the proportions for blending are recommended by the plant chemist. The combination of slurry from the various storage tanks is then pumped to the blending tanks by centrifugal pumps. The pumping system is arranged so that slurry may be drawn from any of the tanks and delivered to any of the others. In case of an emergency, the pumping units will have sufficient capacity to empty any of the tanks in four hours. In the blending tanks the combination of slurry is agitated and the chemical analysis checked. After approval by the chemist, the slurry is pumped to the kiln feed tanks.

All eight tanks are equipped with

Minogue-type agitators. Thorough agitation is achieved by combining continuous mechanical and intermittent air agitation. Lifting teeth fitted to the rotating arms prevent any building up on the tank bottom, all parts of which are swept by the intermittent air supply. The lifting teeth thoroughly mix the raw materials, insuring uniform quality of slurry at all depths and preventing formation of dead areas in the storage tanks.

Kiln Department The kiln department consists of two 11-ft., 6-in.-by 475-ft. seven-support kilns, each with a rated capacity of 3,000 barrels per 24-hour day, followed by two 4-ft., 6-in.-by 100-ft. air-quenching-type clinker coolers. An identical installation has been operated very successfully at a Des Moines, Ia., cement plant with a high degree of thermal efficiency and low fuel consumption rate.

The slurry is first delivered from the storage and blending tanks to the ferris-wheel-type feeders' constant-level tanks by centrifugal pumps. Slurry not picked up by feeder buckets overflows and is returned to the kiln feed tanks. The ferris feeders are driven at a speed proportional to the kiln speed by means of synchronous ties, thus insuring delivery of a constant amount of slurry per kiln revolutions.

Each kiln is equipped with a heat-recuperating chain system which aids in transferring heat from the kiln exit gases to the wet slurry. The chain system is designed to extract a maximum amount of sensible heat from the gases to the lowest practical limit. Each kiln will be fired by a Raymond bowl-type unit coal mill equipped with a batch-type automatic scale for weighing coal input. Hot air for coal drying is taken directly from the kiln firing hood so as to insure a continuous flow of hot air for coal mill operation. Coal is conveyed to the coal hopper over the coal mill by an inclined belt conveyor. Direct-current motors will be used to drive the kilns, so as to obtain maximum speed control.

The clinker coolers will discharge the cooled clinker onto a chain drag conveyor, thence into the clinker crusher. The crushed clinker is then transferred into a vertical bucket elevator to be deposited on a weighing meter over an inclined belt conveyor, which will deliver it into the clinker storage bins. Provision has been made to discharge the clinker directly from the coolers into the clinker storage in the event the elevators or subsequent equipment fail to function.

Clinker-Grinding Department The clinker-grinding department is designed to produce standard Portland cement with a maximum degree of efficiency. If desired, the mills can be operated for progressive grinding to produce cement of high early strength.

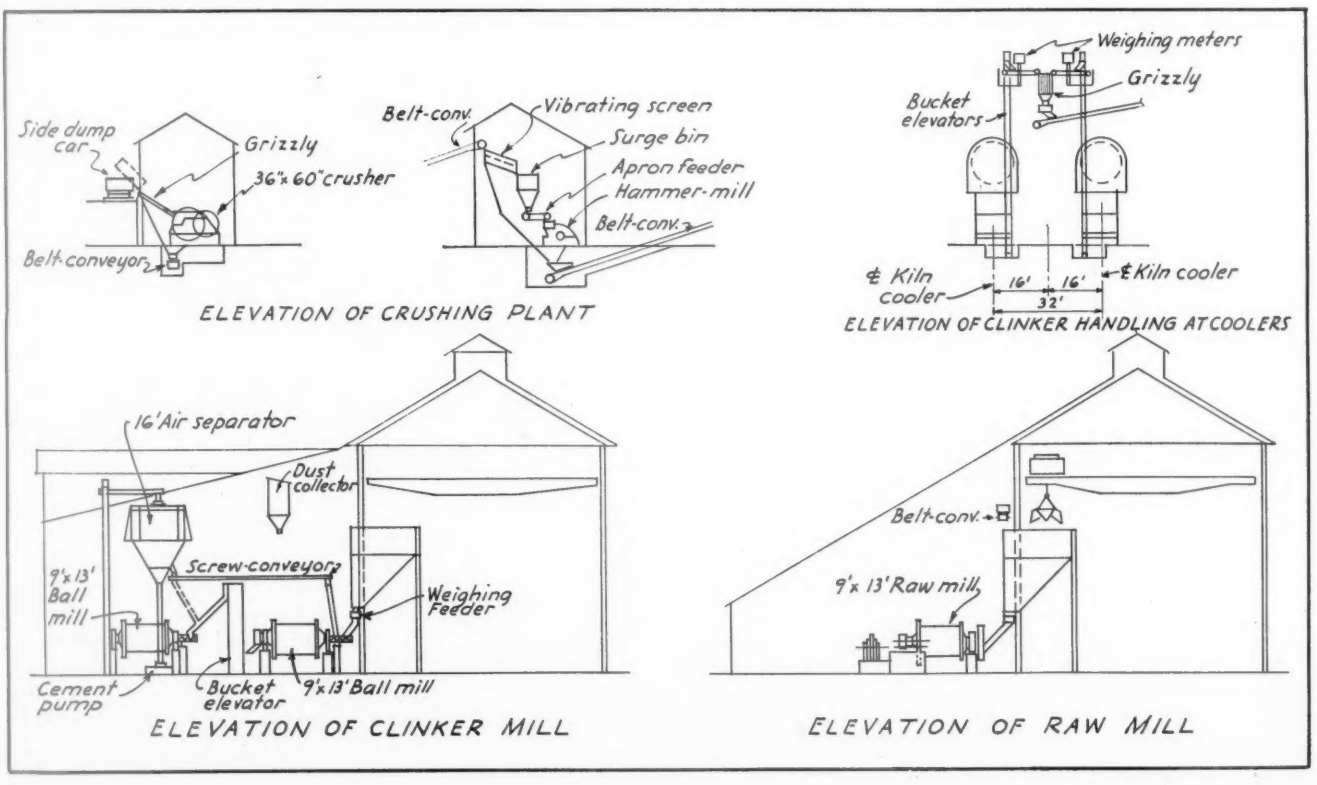
When producing standard cement, the clinker and gypsum are fed from bins into two separate milling circuits in parallel operations. Each circuit consists of one primary and one secondary mill. Rate of feed to each primary mill is controlled by accurate weighing feeders, so as to provide a constant feed at a predetermined rate. The product from the primary mill is delivered by bucket elevator to the secondary mill for further reduction.

The secondary mill is operated in close circuit with a 16-foot-diameter mechanical air separator. Conveying equipment is provided to feed the rejects or coarse material from the separator back into the primary and secondary mills in the required proportion to result in proper balance of the grinding circuit. The fine product or finished cement from the separator is collected into a common cement pump for delivery through a pipe line to the cement storage silos.

This department is designed to provide for an interchangeability of machine parts and a simplicity in operation which generally results in low operating cost. The mills and their driving units are duplicates of the raw grinding mills except for the feeding arrangement. This duplication of parts simplifies the training procedure of operating personnel and eliminates the necessity of stock-

(*Continued on page* 112)

Elevations of crushing plant, clinker handling, clinker mill and raw mill.



Sly Dust Filters—heart of the Complete Sly Dust Control System—at Oliver United Filters, Inc., Hazelton, Pa.

SLY DUST CONTROL GETS ALL THE DUST!

This efficient dust control system collects even the very fine dust which, if uncontrolled, works its way into bearings and other moving parts of machinery, and settles widely over plant and neighborhood . . . the fine dust which also enters the human respiratory system.

While these are important savings, even larger ones are effected by the recovery of valuable materials, notably in the cement industry. In this field Sly Collectors have done such an outstanding job that they outnumber by far any other make.

Ask for Bulletin 98, a 20-page illustrated publication giving important information about dust control and the advantages of the Sly method.

Sly Dust Collectors are different—they get all the dust by filtration through cloth. Over 5,000 installations.

5 SLY SUPERIORITIES

1. **Greater filtering capacity because of more filtering cloth.**
2. **Taut bags (patented) save power and improve dust removal.**
3. **Bags more easily replaced.**
4. **Automatic control (any degree) minimizes or entirely removes the human factor.**
5. **Simpler shaker mechanism results in savings in maintenance and operation.**

THE W. W. SLY MFG. CO.
4748 TRAIN AVENUE . . . CLEVELAND 2, OHIO

MODERN EQUIPMENT PROVES PROFITABLE AT OLD PENNSYLVANIA PLANT

By WALTER E. TRAUFFER

another ON THE SPOT report

THE Giant Portland Cement Company, Egypt, Pa., operating one of the smallest and oldest plants in the Lehigh Valley, along with many other larger producers, has learned that considerable savings can be effected by improving quarrying and raw-material-handling efficiency. With this object in mind a new Diesel shovel and three Diesel trucks were ordered the day after V-J Day. The trucks were delivered in December, 1945, and the shovel in January, 1946. They replaced two old steam shovels, three steam locomotives and 12 cars.

Even in the short period since elapsed the new equipment has amply demonstrated its efficiency and its lower operating cost is apparent. The old system had the two 2½-cu.-yd. steam shovels loading three trains of four 10-ton side-dump cars, each train hauled by a 25-ton steam locomotive. These were never able to deliver more than 1,375 tons of stone to the plant in an 8-hour day. The three trucks, hauling 2,000 feet one way, have delivered 1,664 tons in the same period. In addition—the quarry personnel has been cut nearly in half. Each steam shovel had its operator, fireman and boom man; each train had its engineer, and the track crew brought the total up to 13. The present system requires only two men on the shovel, one on each of the trucks, and a handy man, a total of six. According to D. E. Koch, superintendent, the trucks provide much greater flexibility and operations be-

The three new trucks recently purchased by the Giant Portland Cement Company of Egypt, Pennsylvania.

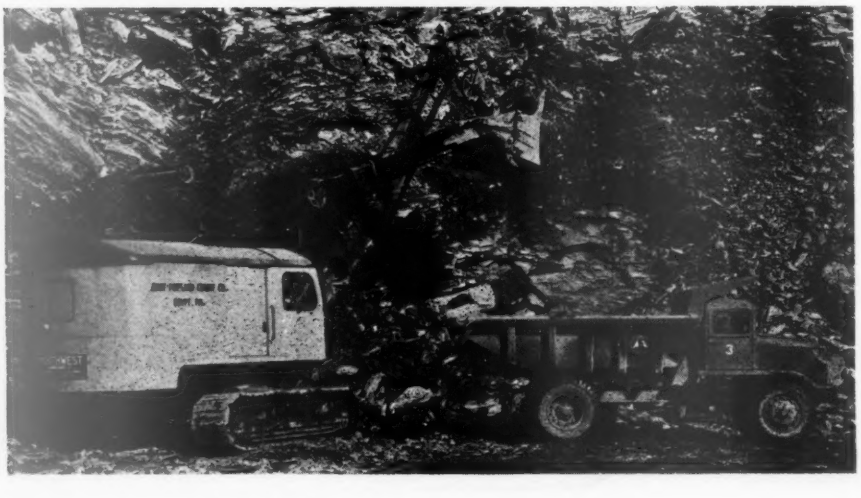
gin within an hour after a blast instead of two days as was formerly the case. He says that overall savings of from 30 to 40 per cent. are being made in the cost of the stone from the quarry to the crusher.

There has been no change in the drilling and blasting methods except that an effort is being made to get better fragmentation. This is being done by using more 75-per cent. explosive in addition to the 60- and 40-per cent. The deposit is stratified and the 13,000-ft.-long face has an average height of 85 feet. The new shovel is a Northwest 80D with a 2½-cu.-yd. dipper and a Murphy Diesel engine. It consumes 2½ to 3 gal. of fuel oil per hour. A-1½-cu.-yd. Northwest machine is also on order and this will be used to help in loading, as a dragline for stripping overburden, etc. Also on order is a Caterpillar D4 tractor with a LaPlant-Choate 108-in. angledozer which will be used to clean up in the quarry and to maintain the truck road.

The trucks are Model FD27 Euclids with 11-cu.-yd. end-dump bodies which carry 15-ton loads. They are powered by 150-hp. Cummins Diesel engines and have hydraulic booster steering, air brakes and dual pneumatic rear wheels. They have five forward speeds and are governed to a maximum speed of 18 m.p.h. Their fuel consumption averages 1½ to 2 gal. per hour. They deliver the stone up a maximum grade of 1 per cent. to the Traylor shaking grizzly feeder ahead of the 48- by 60-in. Traylor primary jaw crusher.

The Reliance plant and quarry, as these operations are known, were actually started in 1902 but the company was actually formed in 1883 as the American Cement Company. The present name was adopted when the company was reorganized in 1913.

The new shovel loading a truck at the quarry.

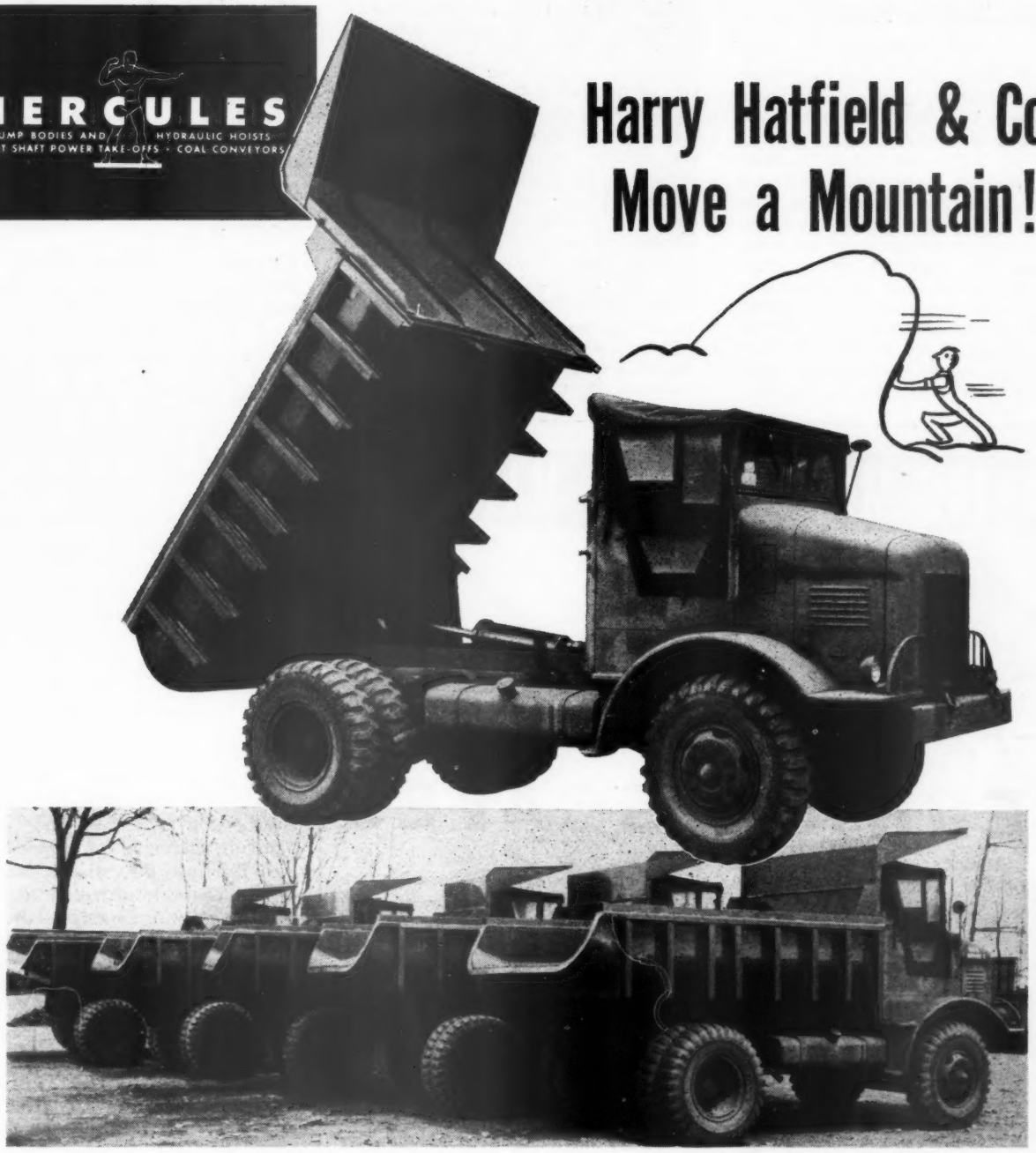


In Mexico City the Ministry of Finance recently announced that the presidential decree allowing duty-free importing of Portland cement and Roman cement has been extended to December 31, 1946. This action was taken because of the shortage of cement in Mexico.

HERCULES

DUMP BODIES AND HYDRAULIC HOISTS
SPLIT SHAFT POWER TAKE-OFFS · COAL CONVEYORS

Harry Hatfield & Co. Move a Mountain!



600,000 cubic yards of stone—enough to make a mountain of respectable size—is being moved in ten of these Hercules Rock Body dump units, owned and operated by the Harry Hatfield Co., Barboursville, West Virginia. Moving a mountain is no easy task, and Mr. Hatfield will need all the help he can find.

And he'll get plenty of help from these sturdy Hercules Rock Bodies! Built-in stamina, the result of years of design and manufacturing experience, will enable these units to stand up under the punishing task of hauling heavy loads over irregular, rough terrain. When the job is done, they'll be ready for more heavy-duty service!

Maybe you aren't planning to move a mountain at the moment, but if you've got a hauling and dumping job that's tougher than you figured, you'll want to know why Hercules Rock Bodies can deliver low-cost, dependable performance on the toughest jobs. Details are available . . . just address Department .

HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

Unique Safety Plan

(*from page* 104)

tection of the valves. These caps must be screwed onto the cylinders at all times except when cylinders are in actual use with gauges connected to them.

Rule 35. Gloves are not to be worn around moving machinery. Employees must not wear gloves of any type while operating drill presses or while working close to revolving machinery of any kind. Men may wear leather gloves or other tight cuffed gloves while operating portable or air-driven tools, but brushing cuttings or shaving off of the drill bit while wearing gloves or with the bare hands is prohibited. Picking up a portable drill by the drill bit is also prohibited. In any event the careless use of gloves will make the wearer liable for arrest under this law.

Rule 36. Inspect your equipment and be sure it is safe before starting to work. Before any well driller or drill helper starts his shift of work as operator of a well drill, he must first go up the derrick and inspect the shaft, crown sheave, sand sheave, bearings and other parts at the top of the derrick and in no case shall the drill be started if the inspection reveals an unsafe condition of any kind.

The Basalt Rock Company of Napa, California, has purchased a tract of land at Ukiah, California, to be used as the site of a new cement-mixing plant and materials depot.

MOVING MOUNTAINS of MATERIAL

—FASTER · CHEAPER · BETTER—

MERRICK SCALES

MERRICK WEIGHTOMETER

Huge quantities of bulk materials are always "on the move" somewhere on belt conveyors throughout the industry —and their weights are being rapidly and reliably recorded by MERRICK SCALES.

MERRICK Weightometer provides an automatic, continuous, and accurate check on materials in transit on conveyors.

It is easily installed, extremely sturdy and durable, and shows exceptional operating economies.

MERRICK FEEDOWEIGHT

MERRICK Feedoweight automatically feeds, weighs, totals and records the amount of material fed. Power operated feed and control gate for correct proportioning. Feeds two or more materials in batch or continuous proportioning.

WRITE FOR BULLETIN

MERRICK SCALE MFG. CO. 188 AUTUMN STREET PASSAIC, NEW JERSEY

Hwa Hsin Cement Co.

(*from page* 108)

ing large quantities of various spare parts. Feeding the air separator rejects back into the mills tends to balance the amount of work done in the milling circuit. This prevents overheating of milling units and reduces the ball coating to a minimum.

Cement Packing Department Cement-storage silos are of the hopper-bottom design to permit complete withdrawal of cement without requiring hand labor. Cement is withdrawn from the silos through a single opening at the bottom of each silo by means of two 8-inch portable Fuller-Kinyon pumps. A cement-reclaiming system is provided to recover spillings from the packing machines or broken bags. A complete dust-collecting system is included for collecting dust particles from packing machines, elevators and packing bins.

Storage Building A 75-ft. by 550-ft. storage building equipped with a 7½-ton traveling crane is provided for raw and clinker storage. So as to reduce unnecessary handling of raw materials and clinker, the conveyor from the crushing plant is arranged to deposit stone into the raw bins and a belt conveyor has been provided to deliver the kiln output directly to the clinker bin. This results in only a small portion of the clinker and raw materials being handled by the storage-yard crane.

The excess raw stone produced during the daytime operation of the crushing plant can be distributed over a considerable length of the storage by the tripper on the belt conveyor. The same is true in the case of clinker. This cuts down operation of the traveling crane to a minimum as far as handling raw materials and clinker is concerned, and enables it to devote its work during the daytime to handling coal and gypsum.

The contract for the detailed design of this plant has been awarded by the Hwa Hsin Cement Co. to the Macdonald Engineering Co., Chicago, Ill. Improvements on the original design have been made from time to time with the expectation that the plant will emerge as the most modern and efficient of its kind.

Construction is to begin at once on the Springfield Sand & Gravel Company's $100,000 rock crushing plant near Springfield, Oregon.

The Decalog of Safety

I. Thou shalt avoid all carelessness.
II. Thou shalt never remove any safeguard or safety sign.
III. Thou shalt not use equipment without authorization, nor undertake any job unless instructed to do so.
IV. Remember always to follow safe practices; if in any doubt about the safest procedure, ask the supervisor.
V. Bear in mind that carelessness and thoughtlessness are the roots of much misery and suffering, both to thyself and others.
VI. Thou shalt report to thy supervisor any unsafe condition about the workplace, and shalt do this without being told.
VII. Thou shalt not play practical jokes on thy fellow-workers, nor distract nor startle them.
VIII. Thou shalt watch over the welfare of thy fellow-employees and help them to become safe workers, even as thyself.
IX. Take care that thy clothing is in good repair and suitable for thy work.
X. Lastly, thou shalt neglect no scratch or wound, no matter how slight it may be; get first aid and promptly, for tomorrow may be too late.

—*Consolidated Rock News*

Keystone Portland Cement Co. Runs 9-Year Liner Test

Featured in the *Nickel Cast Iron News,* published by the International Nickel Co. of New York (first quarter, 1946, issue), was a report on a test conducted at the Keystone Portland Cement Co., Bath, Pa.

Four of Keystone's eight Polysius mills grind wet stone, an operation in which the rate of wear is very high. In March, 1937, "Ni-hard" test liners, made of a nickel alloyed cast iron produced by the International Nickel Co., were installed in the first compartment of one of the wet mills. The compartment, 9 feet, 5 inches long and 6 feet, 6 inches in diameter, has a normal ball load of 28,000 pounds of 3½-inch steel balls. Although the mill was not operated continuously, it had ground, up to November, 1945, a total of 2,030,000 barrels of cement. Plain cast liners in an identical mill handling the same material gave out after 751,000 barrels had been ground. The superiority of service life demonstrated by the test was, therefore 2.7 to 1, with the Ni-Hard liners still good for more grinding.

As a result of the test, Keystone has installed three sets of Ni-Hard liners in the other raw grinding mills, where they are reported to be showing the same resistance to wear. These liners were made by the American Brake Shoe Co., Mahwah, N. J.

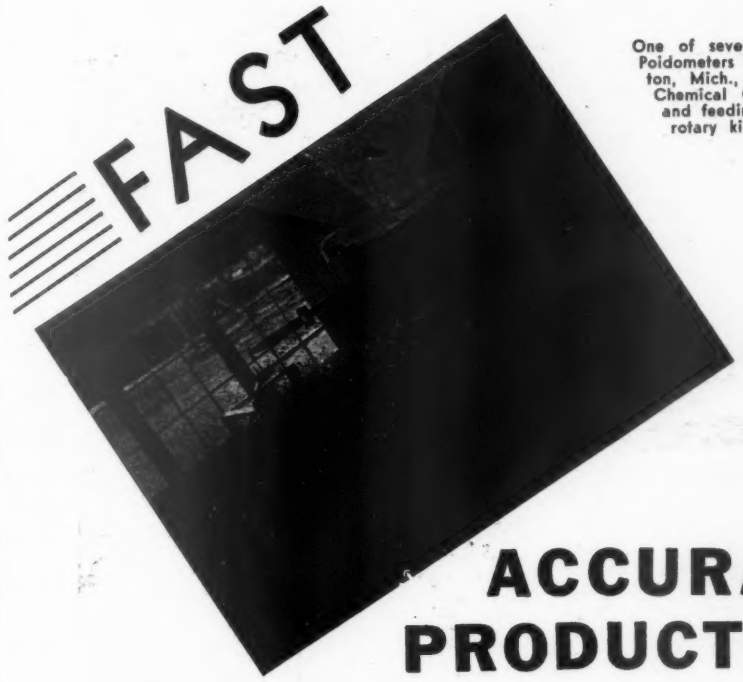
Ni-Hard is an alloy cast iron containing 4.25 to 4.75 per cent. nickel, together with 1.5 to 2 per cent. chromium, a combination providing unusual resistance to wear and impact.

The test liners in the Keystone ball mines.

Other applications of Ni-Hard in the cement industry include chutes; conveyor flights, plates, skidder bars and sprockets; crusher jaws; gyratory crusher bowls; and pulverized rings.

A signal honor was conferred on the La Salle, Ill., plant of the Alpha Portland Cement Co. by the Portland Cement Association, when that organization's safety trophy was awarded to the company for the sixth successive year.

The Federal Portland Cement Co. of Buffalo, N. Y., had no lost-time accidents during 1945 and has been cited in the State Insurance Fund's accident prevention contest.



One of several SCHAFFER Poidometers in the Ludington, Mich., plant of Dow Chemical Co. Weighing and feeding dolomite to rotary kilns.

ACCURATE PRODUCTION

SCHAFFER POIDOMETERS for Weighing Blending Feeding Recording

High speed and precision operation combine to make SCHAFFER Poidometers unbeatable for weighing, feeding and proportioning raw or finished materials.

Poidometers boost production with their automatic action, but they also assist in maintaining the quality of your product by their dependably accurate operation.

These machines are finely engineered and durably constructed for continuous, low-cost operation. Available with remote control recording and operating devices.

WRITE FOR CATALOG No. 5

SCHAFFER POIDOMETER CO., 2828 Smallman St., Pittsburgh 22, Pa.

States Act to Speed Their Home Building Programs

A survey of developments in state capitals throughout the country reveals an increasing trend toward state legislative action of both an emergency and long-range character to stimulate the long-promised post-war residential construction program, with its attendant vast broadening of the market for building materials.

Attacking the problem of getting post-war building under way the states are taking such divergent steps as putting local governments into the housing business and encouraging private enterprise to broaden its housing activities.

The state developments may in some instances prove of more lasting significance to the building and related industries than efforts originating in Washington. Such steps as elimination of local building code obstacles are necessary to any real solution of the housing problem. Other action of vast importance includes the clearance of state legal obstacles from the path of large-scale investment of private capital in residential real estate by such groups as the life insurance industry, with its $49,000,000,000 of assets.

In attempting to solve the emergency need of housing for veterans, the states in a number of instances are moving to use their own resources, rather than leaning so heavily on the Federal Government, as was the tendency during the war and in the depression decade. As one step in its emergency housing program, New York State's legislature this year passed a bill appropriating $35,000,000 for temporary dwellings.

Another bill in the New York program, which would permit municipalities to grant tax exemption for a period not to exceed 12 years on alterations and improvements to dwellings. The measure also would authorize abatement of taxes on the entire property up to 80⅓ per cent. of the cost of rehabilitation during each year. Another New York bill would increase the subsidy for permanent low-cost housing from $6,250,000 to $9,000,000.

Enacted by the Massachusetts legislature was a bill granting broad emergency powers to cities and towns to provide housing for war veterans. The measure empowers local governments to raise and appropriate money for veterans' housing; to take land by eminent domain for the erection of temporary shelters; to borrow outside the debt limit up to ½ of 1 per cent. of their valuations for five-year bond issues to finance such programs. Another bill introduced in Massachusetts would authorize a $25,000,000 state bond issue, with which the State Housing Board would buy land and build homes with preference in retiring or sale to veterans.

A bill introduced in the Rhode Island legislature would give sweeping powers to municipalities to undertake construction of dwellings for veterans and their families. The measure would empower municipalities to raise and appropriate funds directly or to match Federal grants.

Illinois has contributed $4,300,000 to the Chicago Housing Authority for use in acquiring land for veterans' housing. A bill providing for state loans to veterans for home or farm purchase is pending in the Mississippi legislature. California's legislature, in special session, considered expansion of its program of farm and home loans to veterans, along with an appropriation to help finance conversion of federal war housing to veterans' homes.

Another form of state action to meet the emergency situation was the appointment by Minnesota's Governor Thye early this year of a state "housing expeditor" to work with building supply industries and Federal agencies on materials distribution.

Scattered throughout the country there are many towns whose names are of interest to those concerned with stone and other building materials.

A search through the U.S. Official Postal Guide uncovers the following: Asphalt, Ky.; Bluestone, W. Va.; Bricks, N. C.; Cement, Okla.; Clay, Tex.; Concrete, Wash.; Dolomite, Ala.; Firebrick, O.; Glass, Va.; Granite, Ore.; Gypsum, Kans.; Lime, Ore.; Marble, Minn.; Mastic, N. Y.; Plaster City, Calif.; Rock, Kans.; Sand, Tex.; Sandstone, W. Va.; Slate, Va.; Stone, Idaho; and Tile, O. And, of course, you can't overlook Mason, Mich.

* perfect **combination** for the Cement Plant — a 10 ft. Hardinge Conical Ball Mill, Superfine Air Classifier, and "Electric Ear" grinding limestone to 91% minus 200 mesh. The unrivaled efficiency of Hardinge **matched** equipment makes it the natural choice for Cement Plant owners who judge a system on performance, not price.

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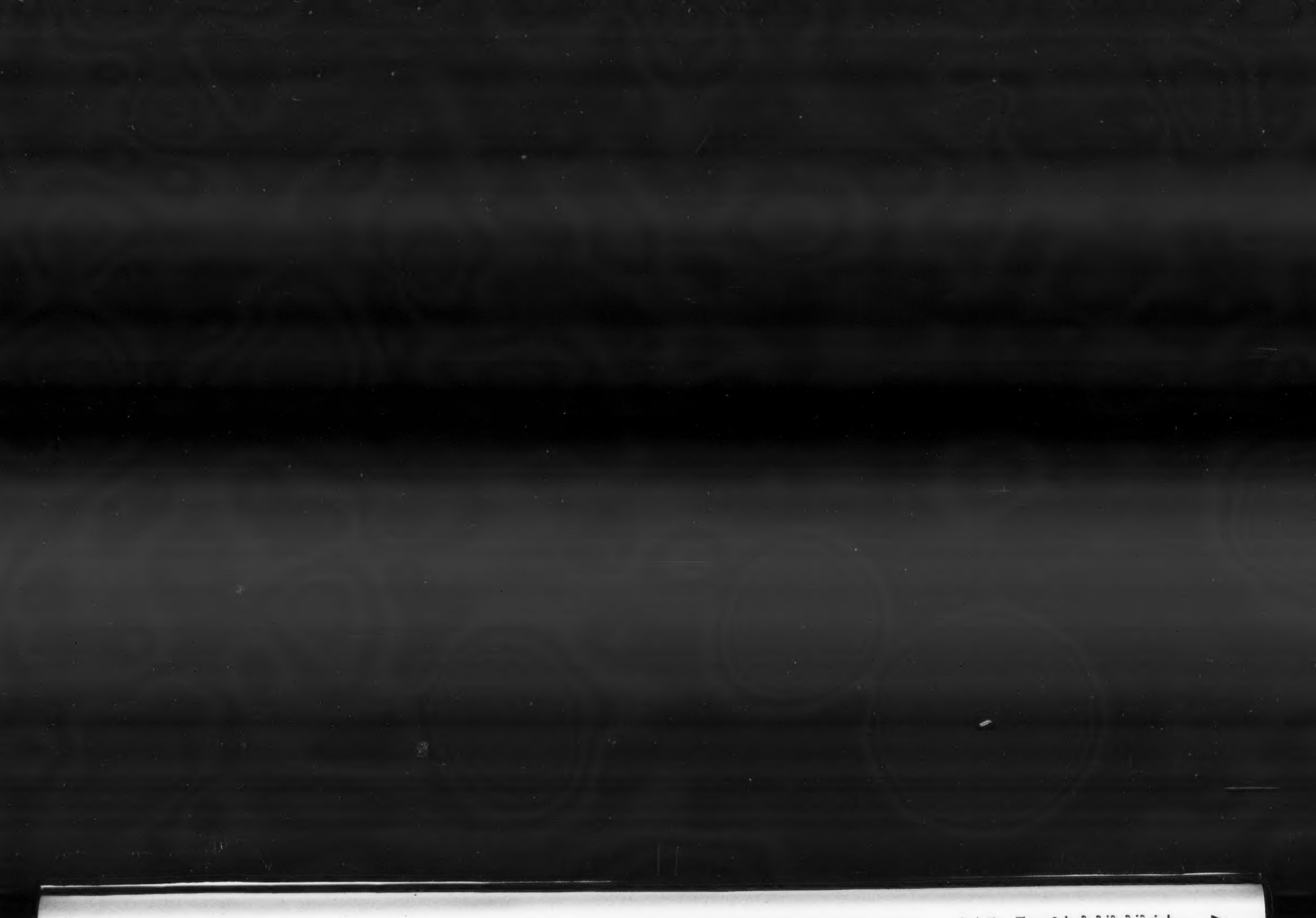


INDUSTRIAL SAND PRODUCERS CONSIDER HEALTH PROBLEMS AT ANNUAL MEETING

another ON THE SPOT report

THE Eleventh Annual Meeting of the National Industrial Sand Association, which was held at The Homestead, Hot Springs, Virginia, May 15 and 16, 1946, drew a record attendance and the membership of the Association is at an all-time high. Industry problems, particularly that of dust control, occupied most of the time at the meetings, and two important papers on this subject were presented. Also of vital interest to the industry were discussions by William L. Pringle, Office of Price Administration, on the future of this body; by Vincent P. Ahearn, executive secretary of the association, on industry problems; and by Stanton Walker, consulting engineer, on research. At this meeting it was decided that the Fall meeting of the Board of Directors will be held at the Edgewater Beach Hotel, Chicago, on October 24-25, 1946. The next annual meeting will be held at Hot Springs on May 14 and 15, 1947.

New Officers A. Y. Gregory, Whitehead Brothers Company, was elected president succeeding T. C. Matthews, Pennsylvania Glass Sand Company, who had served two years. G. A. Thornton, Ottawa Silica Company, is the new vice-president, and Sterling Farmer, Sand Products Corporation, is treasurer. The directors are:

Hamilton Allport, Standard Silica Corp., Chicago; E. M. Durstine, Keener Sand & Clay Co., Columbus, O.; C. M. Hardy, Hougland and Hardy, Evansville, Ind.; Wm. J. Muhlitner, Great Lakes Foundry Sand Co., Detroit; C. R. Wolf, New Jersey Silica Sand Co. and National Pulverizing Co., Millville, N. J.; J. S. Cable, Minnesota Mining & Mfg. Co., Akron, O.

Mr. Matthews opened the meeting by briefly reviewing what the industry contributed to the winning of the war. First an estimate was made of the ability of the industry to produce a certain amount of material and this was then done without government help and with very little new equipment. Now that this war is won, said Mr. Matthews, we are faced with another war of shortages and other handicaps and the industry can also win this.

In his "Report Upon Association Activities Dealing with Legal Matters Relating to Industrial Health," Theodore C. Waters, member of the firm of Mullikin, Stockbridge and Waters, Baltimore, and association counsel, summarized the latest developments and concluded by advising members that it was good business to do everything possible to promote healthful working conditions but that everything possible should also be done to see that any regulations imposed by government should be reasonable and not interfere unnecessarily with operating efficiency.

Mr. Waters, in reporting on state codes of industrial hygiene said that the activity of these various states along these lines has increased and that the United States Public Health Service has prepared the draft of a model set of rules and regulations for the control of industrial hazards, which would be submitted probably late this year, to the state departments of health for their consideration and adoption. He cited the case of the code of industrial health proposed by the State of Ohio in which it was made mandatory to substitute non-injurious substances or those having lesser hazards, for those having greater hazards. The association, after consultation with state officials, was able to procure the complete deletion of this provision, which, if adopted, would have served as a precedent for other states. Amendments suggested by the association were also adopted. This code will become effective on January 1, 1947.

Mr. Waters also mentioned the industrial hygiene code proposed by the New Jersey State Department of Labor which was in many respects similar to the Ohio code. Here again the association was able to submit a few amendments which were favorably received but have not yet been acted on.

On the subject of aluminum therapy treatment of silicosis, Mr. Waters quoted from a report published by the American Medical Association to the effect that such treatment should not be used where exposed employees have active tuberculosis, and that many practical problems would have to be solved for the handling of the mixture. Labor, he said, is asking management to install equipment for the adminstration of aluminum therapy but in his opinion it would be better to install dust collectors so that there would be no silicosis to cure.

Mr. Waters also told what has so far been accomplished toward the reduction of the high compensation-insurance rates. Through discussions with insurance company officials and others he believes there is a possibility that these rates may soon be brought more nearly in line with the experience had by carriers under the various state laws wherein silicosis was compensable. As an illustration of the lack of uniformity in these rates he pointed out that the overriding occupational disease rate in addition to the base workmen's compensation rate is nearly twice as high in Illinois as it is in New Jersey, and that both rates are far higher than actual experience justifies. He suggested that in order to get some action each company should approach its State Insurance Department and appeal for reductions where experience proves that they are justified, and that each plant should be resurveyed for hazards to be eliminated. In the ensuing discussion Mr. Ahearn reemphasized the fact that control of the dust is the one most important step that can be taken.

Dust Problems In discussing "The Dust Problem in Sand Manufacture," Theodore F. Hatch, Industrial Hygiene Foundation, Pittsburgh, said that one of the handicaps to the control of the dust problem has in the past been the lack of adequate information on the extent of the hazards. Now, with the demand for objective study and evaluation, he said, many of the old difficulties are being overcome and encouraging results are being obtained. Silicosis, said Mr. Hatch, is now publicly recognized as a compensable disease and this must be frankly recognized by the industry. Dust control, he said, is an essential part of operation in any plant where silica is crushed or pulverized and industry has no quarrel with the regulation of working conditions provided that they do not make unreasonable demands on it.

Mr. Hatch then described some of

the provisions in the new codes and the reasons for them. He went into detail on the relation the free silica content of a product bears to the permissible concentration of dust in the air, ranging from 5 m.p.c.f. for dust containing over 40 per cent. free silica to 20 m.p.c.f. for 10-20 per cent. concentrations. These provisions he believes to be in accordance with the best information today and should be the goal of all industries in which a hazard exists.

Experience in allied industries, said Mr. Hatch, indicates that the proposed level is attainable although it is not easy or cheap, especially in effort. So much has already been accomplished, he said, that an industry-wide pooling of effort and experiences will yield good results. It is the function of the Foundation, he said, to provide a technical center for just such joint studies by member companies and excellent results have already been obtained by some industries. He suggested that the sand industry undertake a joint study of its dust problem, working through the central facility of the Foundation and an advisory Technical Committee of the Association.

A. Warsaw, Wedron Silica Co., Chicago, chairman of the committee on the control of dust in abrasive blasting, told of the manual prepared with the co-operation of the I. H. F. and the N. I. S. A.

C. Mathiesen, Whitehead Brothers Co., Albany, chairman of the committee on foundry sand, spoke of the resumption of this work and said that while the industry should keep in touch with its customers' problems it should not delve too far into them. He recommended that the A. F. A. be permitted to appoint a member on the committee and it was voted to do this.

Mr. Ahearn in his address told of the difficulty of getting new equipment and said that it would be at least a year before things got much better. He advised producers who can't get reasonably early delivery to apply for a preference rating under Order CPA-541A. On the subject of cars he said that the supply is short, their condition is bad, and that when crops start moving things will get worse. This affects box cars but the supply of open-top cars will also worsen when the Fall movement of coal begins.

In discussing industry action on the proposed freight rate increases such as was taken by the sand and gravel, crushed stone and slag industries, Mr. Ahearn stressed the advantage of presenting a unified case against this suggested increase which he called exorbitant.

New Plants, Improvements

(*From page 76*)

Push-button control at two points has eliminated man-power to a great extent and only two men are required to operate the entire plant. Conservation of labor is also apparent in the pit, close to the plant, where a single truck driver operates the two dump trucks, driving one to the plant hopper and returning while the other is being loaded by the ¾-cubic-yard P&H dragline.

The jaw crusher and the scalping screen at the Union Rock & Materials Company.

Grizzly bars over the 35-ton-capacity plant hopper reject plus-6-inch boulders and the pit-run material is put on a 30-inch by 65-foot belt-conveyor by an S-A 2- by 5-foot plate feeder. The feeder, driven by a 5-horsepower Speed-trol motor, can be adjusted to feed from 30 to 90 tons of material hourly, depending upon the character of the material being excavated. This varies greatly at times with high percentages of either gravel or fines, the last-named condition generally prevailing.

The first conveyor delivers, in a straight line toward the plant, to an S-A 3- by 8-foot single-deck vibrating screen which scalps off the plus-1½-inch rock, the oversize going directly into the feed opening of a 15- by 24-inch Cedarapids jaw crusher. The crushed product and the scalping-screen throughs are carried by the main 20-inch by 140-foot belt conveyor to the top of the washing-and-screening plant. Two S-A 3- by 8-foot double-deck vibrating screens equipped with spray nozzles do all the sizing and washing. The first screening unit has 1-inch mesh on the top deck, rejects being chuted back to ground level for further reduction in a Symons 2-foot standard cone crusher. The cone is in closed circuit, its product being returned to the main belt by a 16-inch by 80-foot conveyor. The lower deck of the first screen makes ¾-inch gravel, throughs passing to the second sizing screen which carries 7/16- and ¼-inch mesh on the top and bottom decks, respectively. Fines passing the lower deck are processed for sand and the mesh may be changed to yield either concrete or plaster sand. An S-A 12-foot drag equipped with 24-inch paddles makes the sand. The finished products, 3 sizes of gravel and 2 of sand, drop into the 5 compartments of the truck-loading bin which have a total capacity of 250 cubic yards. No provisions have been made for sizing or storing crushed and uncrushed materials separately. Concrete walls in the truck-loading tunnel remain from the old plant but the bins and supporting pillars were newly constructed of reinforced concrete.

Water for washing is provided by a 4-inch Deming centrifugal pump. Total connected horsepower is 134, the largest motor being the 50-horsepower unit which drives the primary crusher. Power is purchased from the Salt River Valley Water Users' Association. Much of the equipment, as well as the engineering of the plant, was provided by the Los Angeles branch of the Stephens-Adamson Manufacturing Company. Goodrich belting is used on all the conveyors.

Three Flam vibration block machines are employed in the concrete-block plant. All units are 4 inches in height, the 16-inch length being a popular block because of its appearance when laid up in the wall due to its similarity in size to native adobe which continues to be traditionally popular in the west and southwest.

Ready-mixed mortar is delivered by the company's dump trucks. The lime putty is aged in open vats alongside the plaster-sand bins which serve two batch-type mortar mixers. The lime is removed from the tanks and transferred to the mixers by the hand-shovel and wheelbarrow route.

W. T. Bartol is the owner of the Union Rock & Materials Company and Glen Jones is superintendent.

In the Pit and Quarry Handbook and Directory can be found the answer to nearly every question about the nonmetallic minerals industries and the methods and equipment used by them.

MOVABLE CRUSHING PLANT INSTALLED AT PORTER BROTHERS QUARRY

By WALTER E. TRAUFFER

View of Porter crushing plant as set up during operation. Diesel-driven shovel deposits quarry stone on apron feeder above the 2-deck vibrating screen.

another ON THE SPOT report

TO one of the pioneers in the production of agricultural limestone goes the distinction of being the owner of the first of a new line of portable crushing plants. Twenty-two years ago Elmer Porter and his son, Frank, founded the firm of E. E. Porter & Sons and put in operation a small, wheel-mounted pulverizing plant near Roscoe, Illinois, with a capacity of 5 tons per hour of agstone. This must certainly have been one of the first plants to produce agstone intentionally as most crushed limestone producers at that time were still giving the dust produced in their operations to farmers willing to haul it away. This plant was later replaced by a larger portable operation with an hourly capacity of 40 to 80 tons of agstone and a lesser amount of crushed road rock. When the elder Porter died over a year ago the firm name was changed to Porter Brothers and it is now owned and operated by Frank Porter and three younger brothers, Grover, Drexel and Dale, and a brother-in-law, Floyd Mosher.

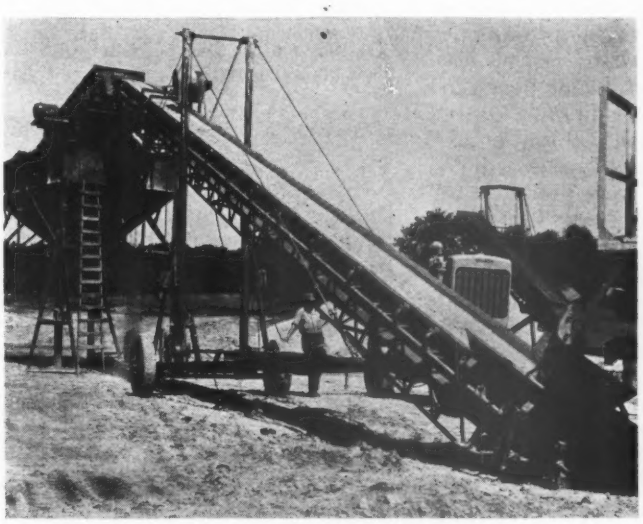
On April 18, 1946, this firm became the owner of the first complete portable crushing and pulverizing plant made by the Dixie Machinery Manufacturing Company.

When the writer called to see this plant in operation early in June, 1946, it was located in the same quarry, 3 miles southeast of Roscoe, in which the company first started operations. This is one of 32 quarries, mostly in Winnebago County, in which the company has operated; ten of these are still used from time to time.

The company has held A.A.A. contracts ever since that body was formed but most of its output has always been sold direct. For some years contracts had been held for Winnebago County, for Boone County to the east, and Rock County, Wisconsin, to the north. Last year, for example, these contracts totaled 20,000 tons but 50,000 tons of agricultural limestone was sold. This year no contracts were let in this area but it is expected that 100,000 tons of agstone will be sold in these three counties. The road stone produced is sold largely to farmers for drives, barnyard repairs, etc., and for township and county roads.

The Roscoe deposit consists of a highly-stratified limestone testing over 100 per cent. calcium carbonate equivalent. The overburden averages 18 inches in thickness and is

Left: Sixty-foot belt conveyor connects discharge end of plant with screen above truck-loading storage bin. Right: Three-quarter-cubic-yard shovel charging apron feeder mounted above the 2-deck vibrating screen.



removed by an Allis-Chalmers tractor and a LeTourneau Carryall scraper. About 6 feet of the top of the 18-foot face is so badly weathered and broken that the shovel re-

Power for electrically-operated plant is supplied by a 67-kw. portable generating set.

moves it before drilling is done. Blast-holes are drilled by a Chicago Pneumatic wagon drill on which is mounted a No. 60 drifter and using Timken detachable bits. Air is supplied by a Chicago Pneumatic 500-c.f.m. portable compressor. A second well drill with a No. 70 drifter is on order.

Very good results have been obtained with the detachable bits which drill 500 feet of hole at the rate of 1 f.p.m. before they are worn out. They are not resharpened. The explosive used is American Cyanamid 40 per cent. quarry gelatin and is detonated by electric caps and a battery.

The Koehring ¾-cu.-yd. Model 303 shovel is driven by a Caterpillar D4600 engine. It deposits the quarry stone direct on the 40-inch by 10-foot apron feeder of the Dixie portable plant. This provides a fairly steady flow of rock to the 4- by 8-foot Tyler-Niagara 2-deck vibrating screen which controls the sizes produced. The material through the bottom deck is always agstone; that passing over either the top or both decks can go to the crusher, depending on the type of product desired. The practice of loading direct to the pan feeder is unusual but practical as it is only necessary to move the plant every two days to keep up with the shovel and this is done in 1½ hours.

The Dixie Premier 36-40 Non-Clog crusher and pulverizer has the well-known Dixie traveling breaker plate. It has eighteen 90-lb. reversible hammers and is driven at the rate of 900 r.p.m. by a Caterpillar D17000 Diesel engine through V-belts. The fines from the screen and the mill product drop on a 36-inch by 28-foot belt conveyor.

The product is discharged from the plant conveyor onto a 30-inch by 60-foot Austin-Western portable belt conveyor which is adjustable to discharge at any height up to 25 feet. Manually-operated hoists raise and lower the conveyor and it is mounted on two pneumatic tires. It is driven by a 10-h.p. electric motor.

When a combination of two or three materials is being made—this conveyor discharges the material on a 4- by 12-foot Seco 2-deck screen on top of a 25-ton, 3-compartment Gruendler steel truck-loading bin. When only roadstone is being made

Variable-speed unit and gear reducer, driven by a 7½-hp. motor, supply power for the feeder.

—the material is discharged from the conveyor direct into the bin. When three sizes are made they are: agstone, and ½-in. and 1½-in. roadstone.

The actual capacity of this plant cannot be accurately determined as it has not yet been operated at its full capacity for any length of time due to the lack of sufficient delivery trucks and the fact that the shovel is not large enough for the plant; but will soon be replaced by a 1½-cu.-yd. machine. In spite of these handicaps, however, the plant has averaged 150 tons per hour on many days and is believed by the owners to be capable of producing over 225 t.p.h. under ideal conditions. On its first day of operation 659 tons of agstone and 400 tons of minus-1-inch crushed roadstone were produced in 7 hours from shovel feed. The plant is adjustable to produce from 85 per cent. roadstone to 100 per cent. agstone.

When more than one size of material is being made—they can all be loaded from the bin into trucks for delivery or one of them can be stockpiled by a Barber-Greene 24-in. by 40-ft. portable belt conveyor. A Haiss bucket loader is used for reloading into trucks.

Deliveries are made by nine White trucks owned by the company. These are 4- and 6-wheel units with capacities of 6 and 10 cu. yds. Spreaders of the company's own design are attached to the truck bodies when agstone is delivered as 99 per cent. of the orders include spreading. The standard delivered price is $2.00 per ton (including 40 cents for spreading) and the average delivery distance is 12 miles.

The power control system for this plant is notable. Except for the crusher, all the plant equipment is driven by individual electric motors for which the current is supplied by a Caterpillar D8800, 67-kw. portable generating set. The Dixie plant has three separate sets of push-button controls, one at the screen and one at ground level, a convenience and safety feature. These are also hooked up so that the feeder and screen stop automatically when the crusher stops and they cannot start unless the crusher is running. Allen-Bradley switches and Crouse-Hinds conduit are used.

The feeder is driven through a Reeves variable-reduction unit which consists of a 7½-hp. G. E. motor, a Reeves variable-speed unit and a gear reducer, all mounted on one base. The final drive to the feeder driveshaft is by roller chain.

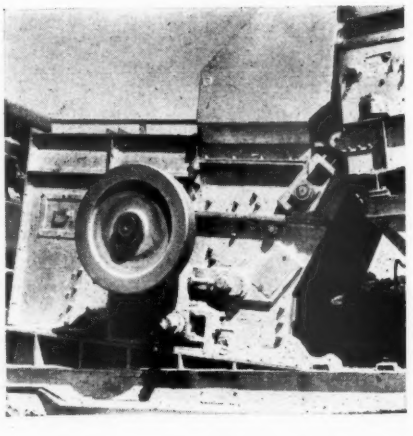
The screen is driven through V-belts by a 7½-hp. Fairbanks-Morse electric motor.

The Diesel engine drive of the crusher has been described. The traveling breaker plate of the crusher is driven by a 3-hp. Fairbanks-Morse motor through a Falk speed reducer and roller chain.

The discharge conveyor is driven by a 10-hp. G. E. motor through an Eberhart-Denver Company gear reducer and roller chain to its head pulley.

The economy of the power system

Non-clog crusher and pulverizer with traveling breaker plate is "heart" of new plant.



used is evident from the fact that the plant Diesel engine uses only 7 gallons and the generator Diesel only 3 gallons of fuel oil per hour. Standard Oil (Ind.) fuel oil is used.

Another feature of the plant worthy of detailed description is the trailer which supports the plant, and its wheel mounting. This was supplied by the La Crosse Trailer & Equipment Co. and has a rated capacity of 53 tons which provides a considerable safety margin over the actual load it carries.

The trailer frame is of welded I-beam construction. The front end is mounted on a pivoted framework with coil springs. In place of the usual front axle actually two axles are used, one supporting each side of the frame. Each short axle has two wheels on each side of its support and it is free to pivot in two directions to compensate for uneven terrain either in transit or in the quarry.

The rear end of the trailer is connected to a similar frame which is rigid and unsprung. To this are attached two similar axles on each side, also free to pivot two ways.

The personnel of the Louisville, Neb., plant of the Ash Grove Lime & Portland Cement Co. was awarded the Portland Cement Association trophy for its work in accident prevention. The plant has had 11 years of accident-free operation.

Natl. Gypsum Co. Head Urges Industrial Safety As Duty of Management

"Protection of human lives and health, with more attention to comfort and better surroundings, is a responsibility which management must meet," Melvin H. Baker, president of the National Gypsum Co., declared at the annual Western New York Safety Conference and Exhibit in Hotel Statler, Buffalo.

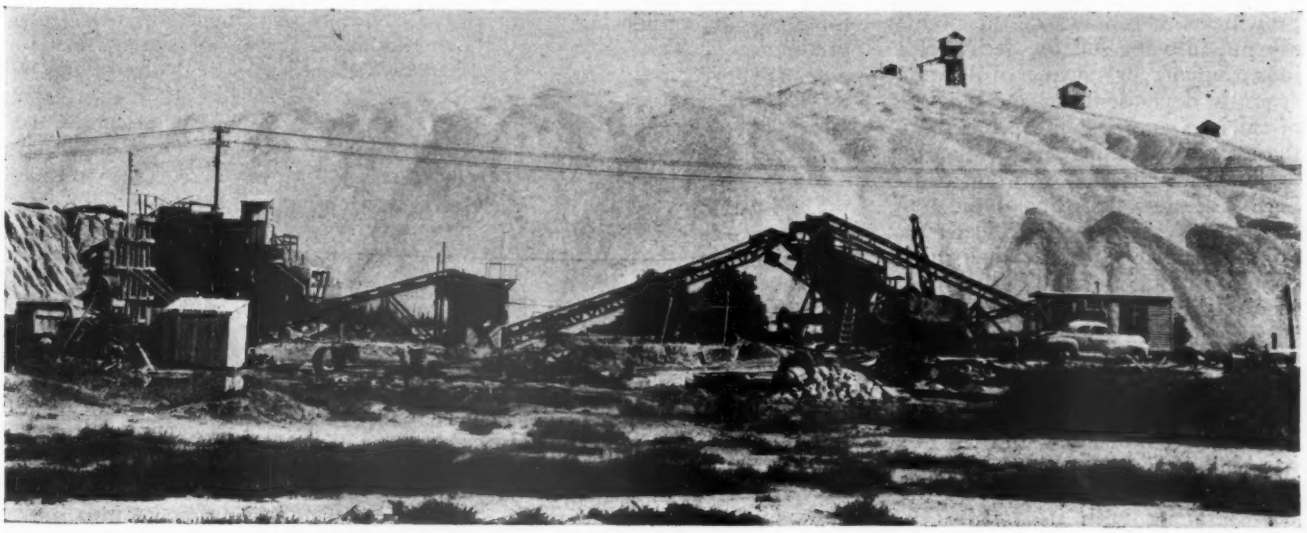
Reporting that the National Gypsum Company has reduced accidents 30 per cent. in the last five years, Mr. Baker said: "The accident-frequency rate has been halved and is now below the average for all industries in the nation and appreciably lower than the rates for similar industries, including mining and quarrying."

Kansas Crushing Plant Makes Ballast For A. T. & S. F. from Flint Rock Chats

TO help the Atchison, Topeka and Santa Fe roll over the country-side as smoothly as a crooner's song, between 150 and 160 tons of flint-rock ballast is produced hourly at the H. D. Youngman crushing plant at Baxter Springs, Kansas. The flint-rock tailings or "chats" from lead and zinc mines, said to be out of the most abrasive rocks known in the United States, are brought to the crusher by dump trucks from mines in the vicinity.

At the Youngman plant two Caterpillar D13000 diesel engines drive the equipment in a Pioneer plant which includes a No. 56 primary jaw crusher with a traveling grizzly feeder, a No. 2436 secondary jaw crusher, and a Pioneer 48-V portable crushing and screening plant with a No. 1030 jaw crusher and a 40- by 22-inch roll crusher. After leaving the crushing plant, the crushed rock is conveyed directly to freight cars. A total of 300,000 tons of ballast, 1½-inch down, will be produced on the job but this will only make a dent in the huge supply of this material available.

Right: Closeup view of H. D. Youngman primary crusher plant near Baxter Springs, Kansas, showing Caterpillar Diesel drive. Below: General view of the plant, with primary crusher at extreme left, from which material is fed to portable crushing and screening plant.



Agricultural Limestone for Better Quality of Foods

By WILLIAM A. ALBRECHT
Department of Soils, University of Missouri

PERHAPS you have never thought that your own body contains the calcium equivalent of about six pounds of agricultural limestone. Probably you have not connected limestone with the calcium that plays such a vital role in the natural synthetic processes that result in protein products both in plant and animal. And it may not be commonly recognized that this nutrient element, as put into the soil by applications of pulverized lime-rock, should have a big share in determining the quality of food for man and beast, and thereby the health of both. We are just now coming around to recognize the greater health value in the quality of foods that are grown on the more fertile soils. The use of agricultural limestone is one of the helps in making our soils more fertile. This practice is, therefore, one of the means of gaining better health by building it from the ground up.

Calcium functions in manufacturing protein.

It is a common practice to use limestone in the corn belt and in the Eastern states in connection with the legumes, the nitrogen-fixing crops, or those protein-rich crops that can provide a part of their nitrogen needs by using this element from the extensive gaseous supply in the soil, air and atmosphere. Liming is readily connected with these crops considered able to synthesize air nitrogen into combination with hydrogen and carbon as organic compounds. It is these that put the nutrient nitrogen into circulation for soil improvement when the proteinaceous residues of the plants are put into the soil for decay. Soil improvement by means of legume crops is dependent on the services of calcium as a protein-maker, more than on any changes this compound as lime carbonate may bring about in the degree of acidity of the soil.

Legumes are also good feeds for animals. In this respect their high content of calcium comes in as help in that service. They are also of high concentration with reference to other mineral elements coming from the soil. It was Prof. A. C. True of the University of Pennsylvania who pointed out that calcium is a kind of coercer to encourage the movement of other soil-borne nutrients, along with itself, into the plant root and into plant functions. For this particular activity by calcium he coined the term "synergistic effect."

Legumes are therefore serving as carriers from the soil to the animal's digestive tract of a rather complete list of essential mineral nutrients. They are also using these in the synthesis of many organic and mineral-organic complexes, so that the legume plants are recognized as excellent forages for young animals. They are desired as feeds to bring about the best growth of bone and muscle. They are *growth* foods having body-building functions, rather than *go* foods giving only energy service to keep the body going. Calcium deficiency in the soil lessens these more valuable plant services. The use of the agricultural limestone aims to improve them and thereby registers its services in more economical production of livestock. One cannot exclude calcium or limestone in considering protein production, which is a very important part of agricultural production. More proteinaceous crops and higher agricultural production in our humid soil regions are almost synonymous.

This article, by William A. Albrecht, Department of Soils, University of Missouri, a well-known authority on soils, should give producers of agricultural limestone a new slant on the functions of agricultural limestone and its vital importance to the health of the nation. His clearly-expressed and substantiated statements make it clear that the increase in production due to the liming of soils is secondary in importance to the other benefits obtained. As Mr. Albrecht says, "This adds nobility to the business."—The Editor.

Depleted soils mean calcium deficiency and relative dominance of potassium.

Every plant is, of course, a kind of woody skeleton that sets itself up like the shell of a factory. Inside this factory the plant uses the raw materials, air, water and soil fertility, and from them manufactures or synthesizes the biochemical complexes that usually go to make seed or to serve as storage reserves for reproduction of the plant later. It is usually these stored reserves as tubers, roots, seeds, shoots or other concentrated nourishments that animals and human beings use as food. These are often only a small part of the plant's total and final mass. They are the plant's synthetic output. They represent, not so much the results of photosynthesis, nor the services of the sunshine in combining air and water into carbonaceous, energy-producing substances, but rather, the catalytic and synthetic activities by the elements of fertility coming from the soil and converting the fuels and raw energy materials of photosynthesis into growth-promoting, body-building materials. These conversions are brought about by the plant's own life process going on independent of the direct help of the sunshine's energy. They result from what may be called biosynthesis, or a synthesis by the life of the plant. It is in these functions within the plant that calcium serves and brings other elements of soil fertility to help in physiological ways still unknown.

We can realize, then, that since plants grow over widely extended areas, they must readily find sufficient soil-support for photosynthesis, the building of their skeletal structure. Potassium is the catalyzing agent of photosynthesis (starch, cellulose and wood making) as one recognizes from its prominence, for example, in wood ashes. In fact it took its name from "pot-ash," the evaporated liquid extract of wood ashes which the pioneer housewife used as lye for soapmaking. Potassium is so widely distributed, so common in granite (the universal magmatic rock) so persistent in the clay fraction resulting from rock decomposition, and so firmly held in weathered soils that almost any soil can encourage the plant's setting up its business of making a woody structure for service in collecting sunshine and air above the soil, and in taking up water by the roots within the soil. Wood making, or simple photosynthesis, is therefore readily possible by the plant on almost any soil. But protein synthesis, mineral elaboration and the building of other essential compounds of equal complexity are dependent on a flow of many fertility elements from the soil, with calcium at the head of the list.

Here is the principle whereby soils rich in lime come into impor-

Photo by Missouri Agricultural Experiment Station

By using more calcium-clay (pH 4.4) in the sand and thereby supplying more calcium (left to right), experimenters obtained plants which were larger and less susceptible to an attack by a fungus suggesting "damping-off". More calcium, rather than less acidity, was necessary to grow healthy plants.

tance. On only those soils delivering lime generously can plants be grown that are contributing proteinaceous products and mineral-rich compounds of distinct value as *growth* foods for animals and man. As the soils have lost their lime content through high rainfall and crop removal, they are growing crops that are highly carbonaceous. They are producing the providers of foods with high energy values, but foods seriously devoid of those values that build bone and brawn. The pattern of lime presence or lime absence in the soils traces also the pattern that emphasizes mainly proteinaceous or mainly carbonaceous foods, respectively. Serious health problems develop where only the latter are available.

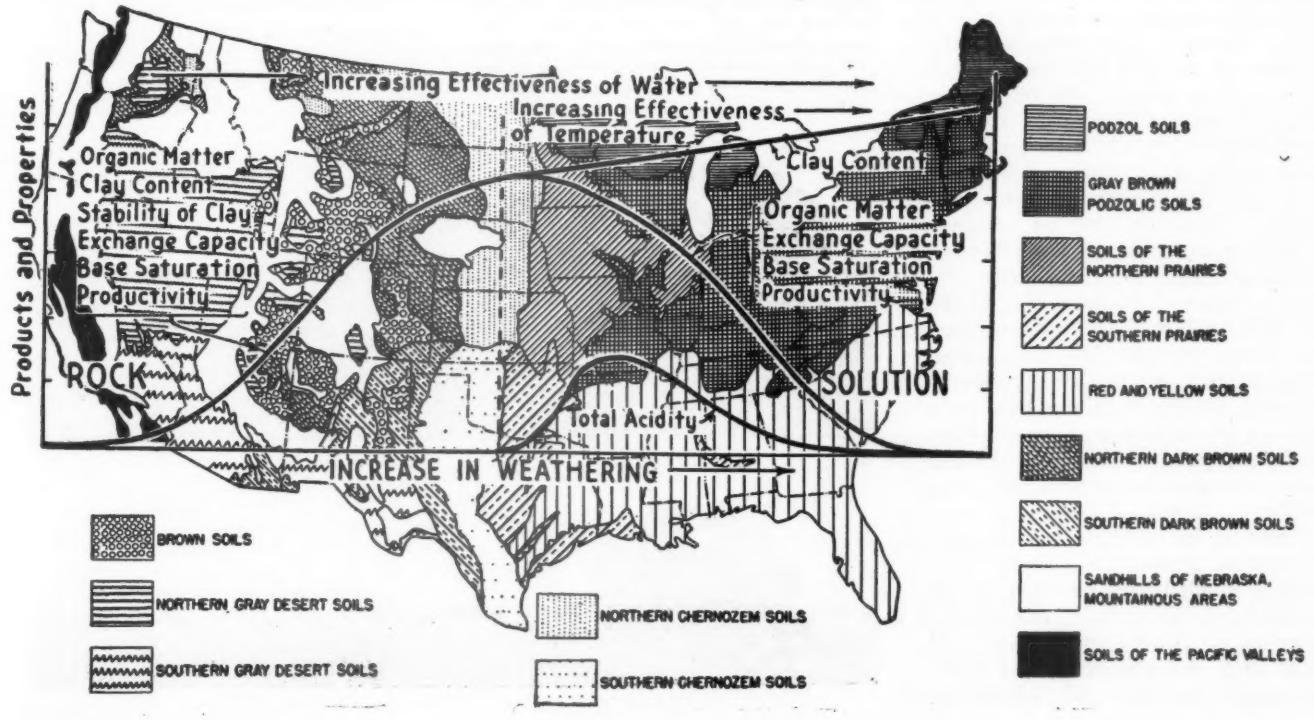
Our West and our East represent lime dominance and lime deficiency respectively.

The climatic pattern of the United States is an expression of a lime presence within the soil in contrast to a threatening lime absence. The former soils, known as "pedocals," or lime soils, comprise our West. The latter, the "pedalfers," or acid soils, with iron-aluminum prominent, constitute our East. We are a divided people (divided into an East and a West), only in the sense of the generous presence of lime carbonate in the soil profile west of approximately the 100th meridian of longitude and the presence of so-called "soil acidity" or deficiency of calcium east of that line.

Perhaps you have not associated differences in peoples as connected with those soil differences, at least possibly not according as different food qualities originate in the soils and as the different foods make people different. We are coming to see ample reasons for classifying the horse-loving, acrobatic Cossacks of Russia, the lean, hard-muscled, meat-eating gauchos of Argentine, and the keen-sighted, six-shooting cowboys of our own Western plains into one and the same group of people according to their similar foods. Their similarity in health quality is determined by the mineral-rich, protein-providing soils of those semi-humid grassy plains. Perhaps the ecological array of human characters will eventually be worked out according as that soil pattern provokes it by way of the food. But when the "Town Without A Toothache" is in the West; when seven out of ten draftees are accepted from Colorado; and when seven out of ten are rejected in one of our southern states in the East, we are more readily prompted to consider that the soil pattern delineated by lime may possibly be a force in controlling some of those differences in health and in other characteristics of the people.

Certainly the differences in crops are readily recognized, since the forests are in the East and the grasses or prairies in the West; and since alfalfa grows readily in the West,

Climatic and vegetational soil groups of the United States. (After Marbut, 1935). This soil map shows the West with calcareous soils, representing soil construction, and the East with lime-deficient soils, representing soil destruction. The curve of weathering forces, as they give soil properties in control of food qualities, finds its maximum on the more fertile black soils.



but is grown only with heavy applications of limestone in the East. Soft wheat of low protein is grown in the East, and hard wheat, or wheat of high protein, is the food quality character in the West. We have come only recently to realize that the fertility of the soil plays the dominant role in making the wheat quality characterized as "hard" or "soft." It is the liberal supply of soil fertility that enables the wheat plant to synthesize enough protein through biosynthesis to concentrate much in the grain and make it "hard." But a soft wheat, one mainly of starch, results through little more than photosynthesis, when the soil fertility is so low that the plant depends to a much larger degree on air and water, rather than on the soil for its raw materials for plant production. Crops in the East are the grains with *fattening* functions mainly. Grasses and grains as crops in the West are distinguished for their *growing* functions. Livestock grows in the West on the lime-rich soils, but fattens in the East on the lime-deficient soils. Much that is classified as "cattle business" and "sheep business" has been provoked in specified territories by the varying quality of the feeds according to differences in soil fertility. These fertility differences are provoked, in turn, by differences in the climatic forces, building the soil by either removing the lime or leaving much of it. It needs no stretch of the imagination, then, to see that food quality goes back to the soil, and that limestone is one of the determiners of that quality.

Lime is needed—so is soil acidity.

The farmer's experience and the science of the soil are now agreed that not the neutral soils but rather the acid soils of the world serve in food production. Alkaline soils, or those with no acidity whatsoever, have not been extensive food producers. They, too, are now known to fail in crop production through failure to supply the crops with sufficient calcium. It is the acidity of the soil that mobilizes the soil nutrients for plant service. We have now come to realize that soil acidity is, in fact, beneficial, since the same amount of fertility is more effective in the company of acidity of the soil than when accompanied by neutrality.

Spinach, for example, so commonly eaten as "greens", has been shown to be a much better provider of the minerals calcium and magnesium when it is grown on an acid soil than on a soil with the same fertility supply but not acid. Much has been said about soil acidity being a condition necessary to prevent potato scab. We now realize that lime is taken by the potato tops in amounts per acre corresponding to those required by red clover. We also are fully aware that potatoes of excellent yield and quality are grown in Western soils which are not acid. We are coming to realize that the soil should be acid, but that calcium should be amply provided at the same time. We are therefore recognizing that it is not necessarily neutrality of the soil that is most helpful for crop production. It is a partly acid soil, well supplied with calcium and the other fertility elements, which grows foods and feeds of good yield and high quality.

The pioneer found these qualities of the soils in the corn belt and the Eastern states when he took them out of their virgin condition. Cropping, erosion, leaching and other destructive forces have depleted the soils of their fertility and left mainly the acidity. We have delayed restoring that fertility because we have looked to lime as ammunition in a war on soil acidity, rather than as a fertilizer and a significant help toward securing better food quality.

Calcium from limestone fragments is mobilized through the soil by acidity.

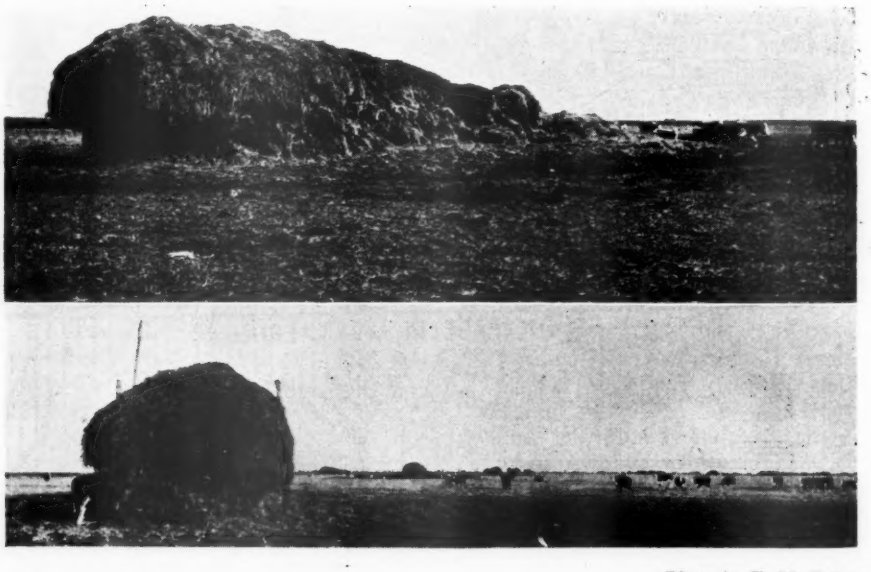
Soil acidity represents mainly a deficiency; but at the same time it is also an intensive activity in the soil. The hydrogen or acidity accumulated there is the most active of the elements. By putting an acid clay on one side of a metal divider and a calcium clay on the other, experimental trials demonstrated that, when the divider was removed to put these two soils into contact, the calcium moved into the hydrogen soil and vice versa at the rate of more than an inch a month. There was no water movement; therefore, these two nutrients were exchanging places under their own activities as a form of diffusion because of the differences in their concentration while absorbed on the clays.

In another experimental test of this mobilization of calcium, limestone particles of different finenesses according to standard screens, for example, 4-mesh and larger, 4-8 mesh, 10-20 mesh, 20-40 mesh, etc., were put into flasks with an acid clay suspension over them. They were shaken at the outset, but such particles naturally settle to the bottom of the flask. In due course of time the coarse material had neutralized the entire mass of clay suspension.

These facts serve to prove that the calcium is broken out of the coarser limestone fragments by the acid of the calcium-deficient clay, and that the calcium diffuses, or moves away from these limestone fragments as a companion activity to that by the more active hydrogen or acidity. Here are the mechanics of the assembly lines within the soil that make calcium mobile there and usable in plants for the production of what we call quality in the products of plant synthesis.

Animals help point the way to soil improvement.

When the bison stayed in largest numbers on the particular grass that has been given the name, "buffalo grass," he was marking out the soil area growing his strictly herbivorous



When some hay from soil fertilized with calcium cyanamid was diluted with some from soil given no soil treatment, the cattle consumed first that part of the stack with the fertilized hay and left the remnant. (See upper photograph.) When only the remnant of the stack remained, consisting of hay from the unfertilized soil, the cattle went to other stacks. (See lower photograph.)

Photo by E. M. Poirot

diet which built his massive bone and mighty brawn. He was also marking out our "hard" wheat belt. He, as a connoisseur of the quality of his feed according to the fertility of the soil growing it, was also connoisseur of it for us. We have come to recognize the animal's discrimination in its grazing, for example, as linked with the fertility of the soil in terms of the plant's synthetic

Photo by Virgil Burke

Limestone and phosphate, once used for alfalfa on a corner of a 40-acre field, led the hogs to seek the nutrients in that section of the field, even though they had to go to it from the opposite corner.

services. It is more than mere fattening values that the animal recognizes. Hogs, for example, have been known to search out for hogging in that particular part of the cornfield where lime and fertilizers had previously been applied for alfalfa. Lambs made better gains on lespedeza hay given lime and phosphate than on that given phosphate only or no soil treatment. Wild animals, too, are pointing to the soil fertility in their choices and the problems of wildlife restoration and management cannot be divorced from the understanding of the soil as it is the producer of this animal crop as well as of plant crops.

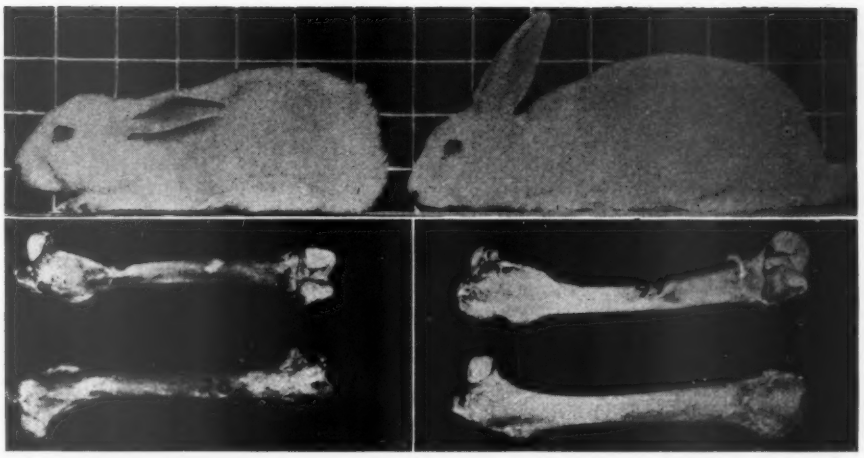


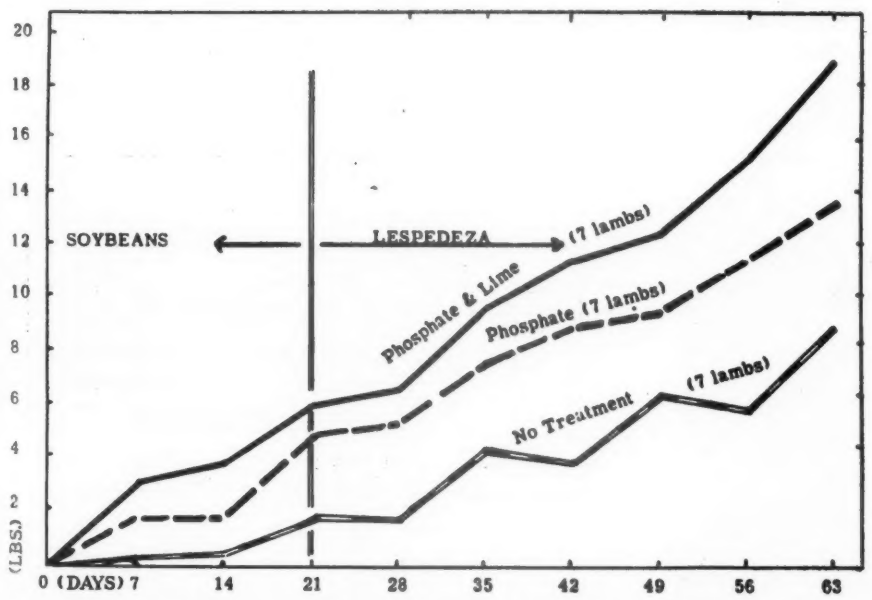
Photo by Missouri Agricultural Experiment Station

Limestone and other additions of fertility to the soil are reflected in the growth of these rabbits and in the size and strength of their bones. Left, rabbit, feeding where soil had not been treated; right, rabbit feeding on grass growing on treated soil.

Studies of animal nutrition are already pointing to the services furnished by limestone in giving better nutrition of animals. Implications of its importance in human nutrition are also coming to attention. Dentists are no longer looking only into the mouths of their patients. They are looking farther to include questioning the foods of their patients and the fertility of the soils growing them. Teeth and bones, consisting mainly of calcium as the ion combined with phosphorus, call for plant services beyond those of photosynthesis and its provision of only *energy* foods. They call for biosynthesis of soil fertility into *growth* foods, and for calcium in the foremost role of giving them these values. Limestone is no longer only fighting soil acidity. It is undergirding growth, reproduction, and general good health of plants, animals and man.

Production of limestone may in no small sense be production of good health via better food quality.

The production of agricultural limestone may be no longer only a sideline in the stone-crushing business. Limestone dust is no longer an off-fall; it has become a life-giving grist. Its sale is no longer a matter of "selling" something in the sense of "lumping it" on the customer. This business has come to be the delivery of a service with values transcending those commonly measured by the cash register or the bank account. According as there is a wider extension of the appreciation of limestone in terms of its more recently recognized values in growing better food quality, the expansion in business in agricultural limestone will likewise follow. It will be satisfying in its financial rewards of selfish appeal, but it will be even more satisfying in terms of services with humanitarian appeal. Good quality of health-giving values grown into food is a new service that the producers of agricultural limestone may well recognize as being thrown in with the bargain when they sell their goods. Surely this adds nobility to the business.



Gains by sheep reflect the different values for animal growth in the hay according to the soil treatment when the amounts of hay and grain consumed were constant. It was lime, in addition to phosphate, that gave the highest growth rate in these trials.

The Oregon Portland Cement Company has applied to the Civilian Production Administration for a permit to build an $870,000 plant at Oswego, Oregon.

THE LIME PLANT OPERATOR

BY WOLF G. BAUER
CONSULTING ENGINEER

KILN MANAGEMENT

PART I—Basic Considerations in Fuel Control

Wolf G. Bauer

THE theme here is "Simplicity" — no matter if we operate a rotary or a shaft kiln. But simplicity is not a matter of omitting certain instruments or controllers. It is not characterized by the fewest number of gadgets. Our automobile mechanism has become more involved, but our control of the vehicle has been simplified. Our object is to neutralize or minimize the many variables automatically, and then bring regulation to a common denominator. Instruments can only indicate or control that which they measure. The placement of the measuring units must be in locations where the story they transmit is not only accurate, but can be translated into simple corrections and adjustments.

This article is not concerned with combustion or calcination control. That follows. Our first concern is control over fuel or fuel-mixture to the burners; and so we deal with the variables that cause fluctuations in the actual heat units delivered to the burner before combustion takes place. In succeeding articles we shall link combustion air control to fuel control, completing the kiln control system with the third factor of burning time regulation. The simplified equation is: Fuel (B.t.u.) Control + Air (lb. 0_2/min.) Control + Heat Distribution Control + Calcination Time Control + Lime Temperature Control = Kiln Management.

The Human Factor

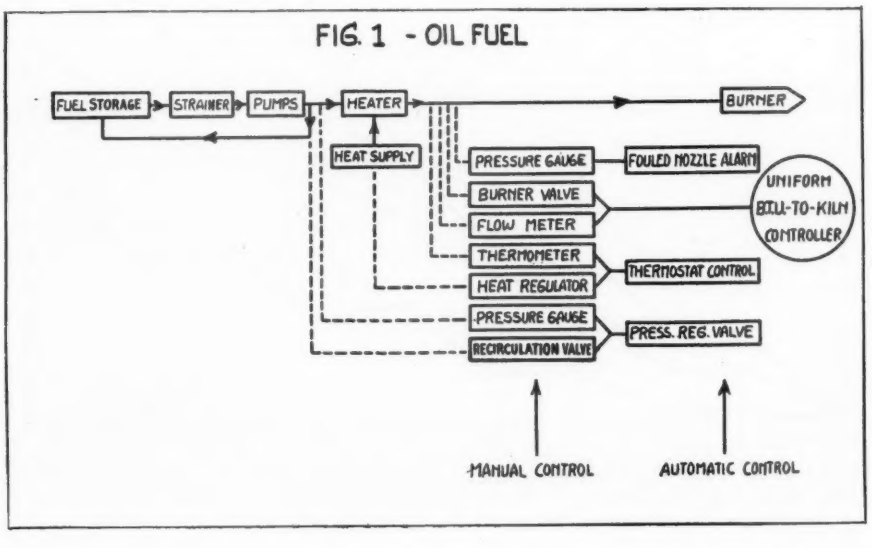
Confidence in measuring-instruments and gauges comes only with improvements in fuel ratios, kiln output, and lime quality directly traceable to their use, be that as an aid to the operator, or a semi- or fully-automatic system. Every installation differs,—the trick lies in choosing the correct locations at which continuous measurements can be taken, and require the fewest adjustments for the desired results.

The manager of the small or medium-sized lime plant who has tried a few instruments here and there on his rotary or shaft kilns with questionable results, will have a more difficult time eliminating the human element from kiln management than the operator who has never used any kind of gauge or controller in connection with the burning of lime. In the former case the firemen may have lost any confidence or respect they might have had at the beginning, and any new gadgets added will probably not be received in the most cooperative spirit. Fortunate indeed is the burning department that not only understands the value of measuring and controlling devices, but also cooperates to still further improve the system.

Without trying to appear critical, the personnel factor is at least 50 per cent. of any instrument control system, and the attitude of the fireman is often a reflection of the manner in which management has gone about trying to make such a system work and pay off.

One peaceful day when everything is neat and orderly on the firing floor, and Mike has the cranky kilns under "perfect" control (even though you wonder what happened to the fuel inventory last month, or feel worried about those on and off complaints about "core in that last car"), you stride upon the scene full of enthusiasm and visions of automatic control. "Mike," you shout as you wake him up from his blissful revery, "we're going to put in some instruments on these kilns and find out, by Jove, what goes on here at night. We're going to put in some recording draft gauges and pyrometers that will check up on you fellows. We'll also have an expert out to take gas readings on the kilns, and he'll set your dampers, fuel and operating schedule where they should be, and you are going to see that they stay there." To make a long story short, Mike has not only been put on his guard, but also behind the eight-ball. For a while he has followed instructions, but soon production, fuel efficiency and lime quality have taken a decided turn for the worse, and to save his operation and skin he has gone back to trusting his eyes. The reasons for this turn of events may be many. Possibly the instruments did not tell the story that Mike could have trusted or used. Maybe too many other variables were not taken into

Fig. 1. Oil fuel control.



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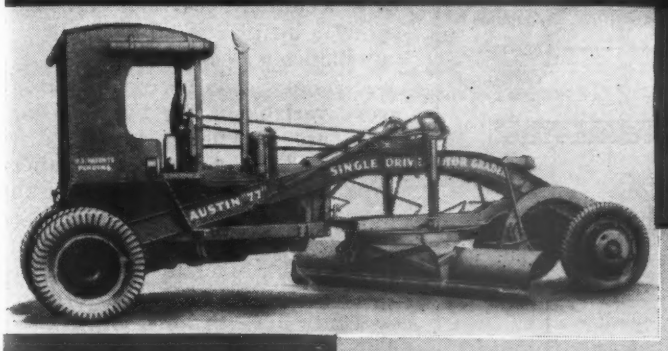

← *1932 Austin-Western Motor Grader.* The first Austin-Western Grader, equipped with Thermoid Hydraulic Hose, represented a distinct advance in road-building machinery.

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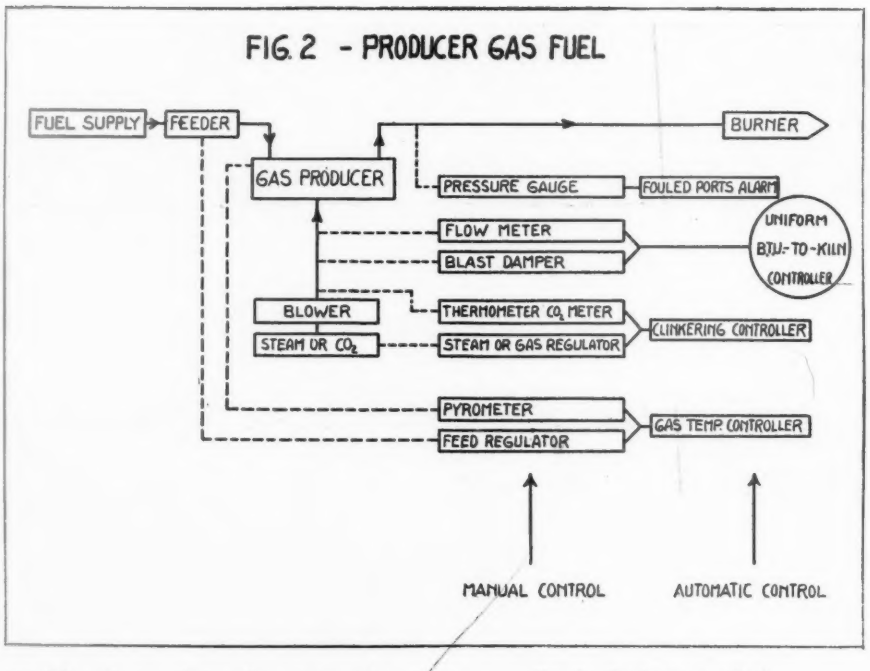


Fig. 2. Producer gas fuel.

consideration when the measuring units and instruments were chosen and set up. In any case the original adjustments could not be maintained without running into trouble, and so Mike, knowing little of the fundamental basis upon which his control system should have been set up, convinced himself and management that his particular small operation was not suitable or adaptable to such semi- or fully-automatic control. Then, of course, there is always the suspicion that Mike might have resented the fact that management would rather have trusted the instruments, trying to judge him by the record charts.

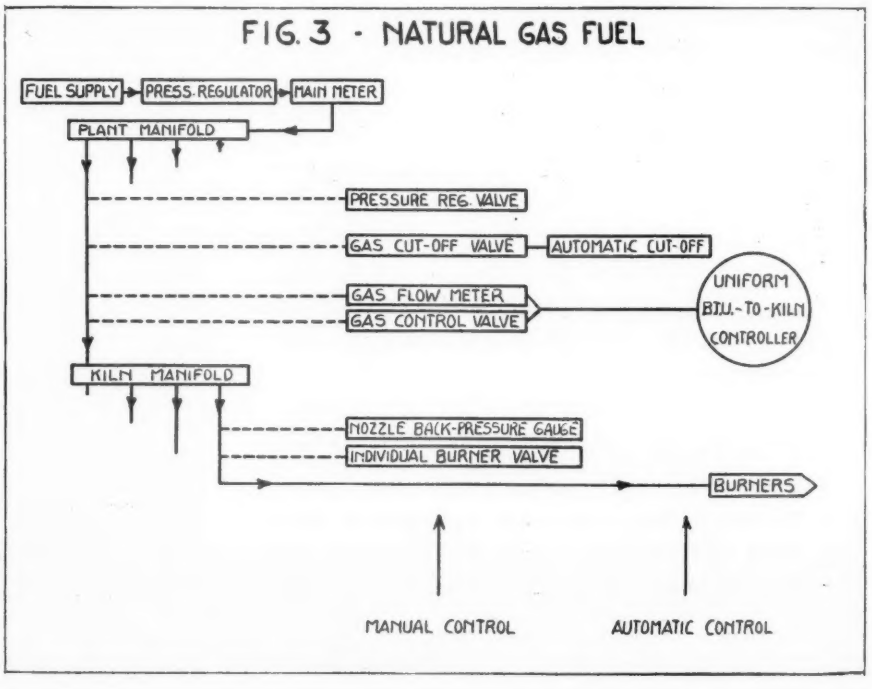
Well, all this may be slightly exaggerated, but we are trying to point to a factor often disregarded. If you want control in your plant, start first with the gradual education of your operators. Before educating them, clarify your own mind on the problems you will be up against. That is where we try to be of help in conducting this department, and because no two plants have ever been built or operated alike, we feel that it is much better to understand basic principles than to quote or illustrate specific instances or installations.

General Considerations

Every process is set in motion by a series of reactions following one another in a chain of definite sequences. The farther back toward the first reaction we can reach in this chain to control, the simpler and more accurate the final control of the process will become. It is sometimes astounding how little most firemen realize the number of variables which they are continuously and unknowingly fighting and trying to offset. Due to the inherent process lag of lime kiln operation, the kiln operators are continuously behind in the actual process reaction correction. Combustion variations are the major cause, and the first line of attack is upon fuel, or better yet,—B.t.u. to burner (not kiln) regulation. No matter with what kiln or fuel we deal, the basic raw materials are carbon, hydrogen, and oxygen. In all cases we must have sufficient oxygen from the air to combine with the carbon and hydrogen quantities in the fuel. To accomplish this accurately, fuel and air must be provided in controlled proportions. Control of air and fuel is possible by measuring volume, weight, or mass, depending on the type of fuel, and what other variables must be neutralized. If we can measure air and fuel accurately, we can also then control them either manually or automatically.

It is not always necessary to bring every variable under control, since some are dependent or linked to others in direct quantitative relationships. Thus we may measure the amperage or watts of a fan motor as a function of the weights of gases handled. Or we may hold the viscosity or density of fuel oil constant by controlling the oil temperature. The important thing to keep in mind when measuring indirectly is not to allow unrelated variables to influence the measurements. For example, one finds draft gauges reading static pressure or suction in dust chambers or stacks of rotary kilns, or in tops or fan connections of shaft kilns. The erroneous assumption here is that the greater the suction or minus pressure, the greater the quantity of gases pulled through the kiln or cooler. The forgotten variable, of course, is the fact that such draft readings are not only affected by the pulling force of the fan or stack, but also by the resistance to the moving gases ahead of the point of measurement, and that changes in this resistance occur due to ring formation in rotaries, depth of lime in air-quenching coolers or stone in preheating section of shaft kilns. Such pressure changes are actually opposite or counter to the values as-

Fig. 3. Natural gas fuel.



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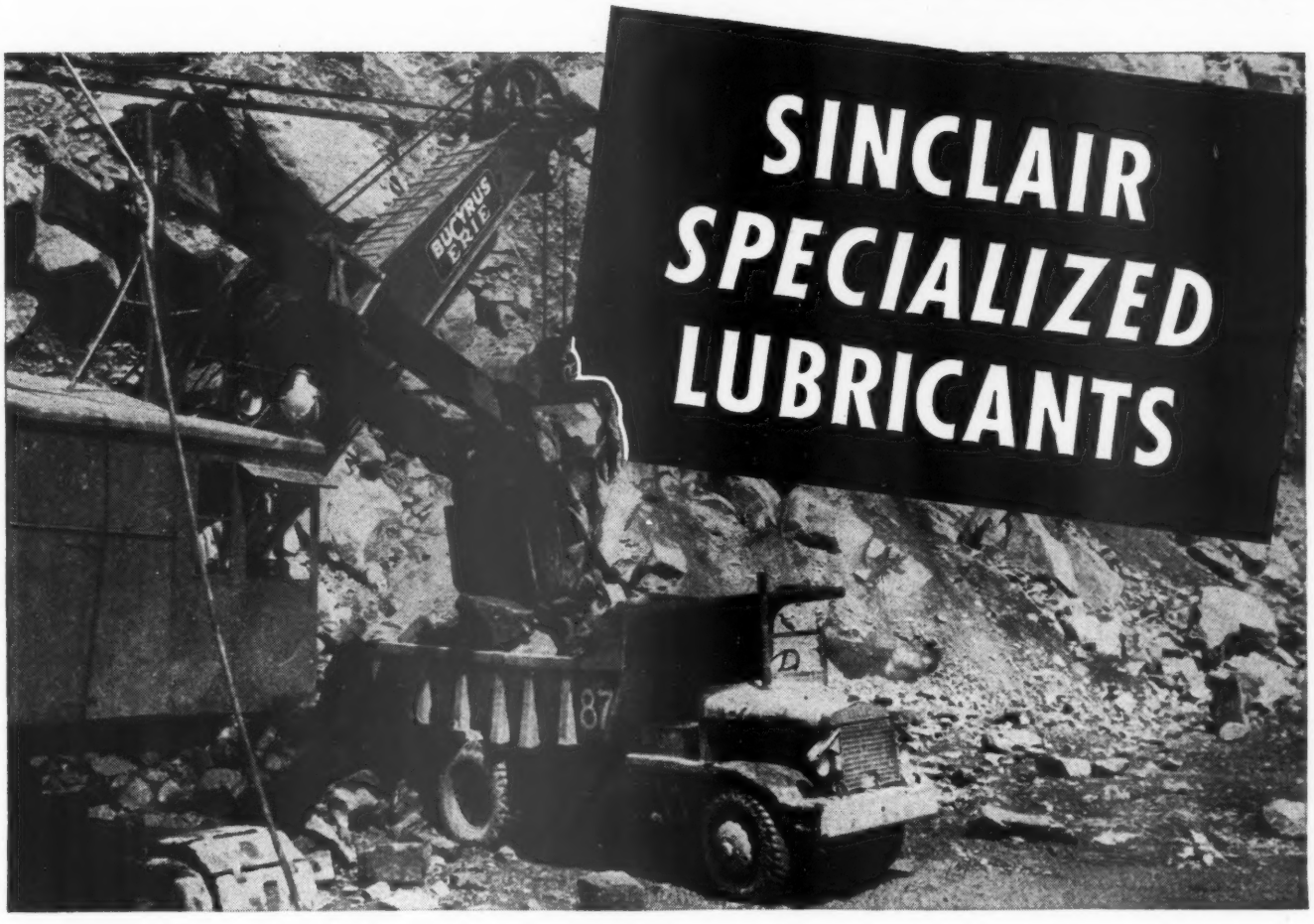

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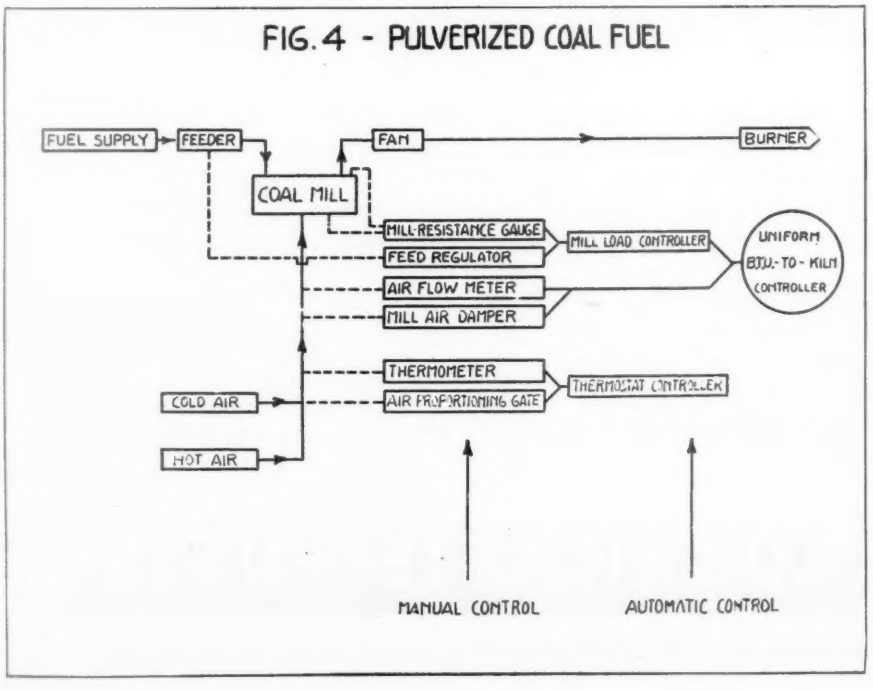
sumed for stack or fan pull only. The obvious correction lies in locating the pressure taps for the draft gauges ahead of the variable resistances, or using a differential gauge which measures actual flow across an orifice or a restriction such as a kiln or grinding mill.

Let us also remember that combustion is a chemical process and that the atoms and molecules entering the reaction do so on a basis of very definite weights of combination. Since gases and liquids change in density with temperature (and pressure), measurements of fuel gases, oil, and air must be on a weight basis, not a volume basis. Gauges which measure velocity, resistance losses, or impact pressure automatically take care of this density variable. If we can hold their temperature and pressure constant, however, then there is justification in most cases to depend on volume measurements for control.

Kilns are fired by either using maximum or optimum fuel input and then varying the calcination time as required, or the fuel input is adapted to kiln conditions. Advantages are and can be claimed for both methods, and will be discussed at another time. The illustrated flow-sheet control layouts are designed for either type of kiln management, as far as fuel regulation is concerned. They also apply equally to shaft as well as rotary kilns, because we deal with basic concepts,—not specific installations.

Our first angle of attack consists of making a list of the variables, and then investigating whether they can be measured directly or indirectly. If they can be measured, where is the most strategic and trouble-free location for the measuring unit? If they cannot be measured, how may we reduce such variables to a minimum? And last,—where shall the controlling valve, damper, speed changer, or switch be located for controlling the measured variable? In order to educate the kiln operators, as well as give them confidence and background for later more fully developed automatic control, it would be wise to make all initial adjustments by manual operation from indicating instruments. In order not to spend money twice on instruments, the necessary indicating and recording gauges, meters, thermometers, or pyrometers should be obtained fitted with control contacts of adjustable range so that electric switch relays or air-operated relays may be connected to power-operated dampers, valves, feeders, heaters, or speed changers.

Fig. 4. Pulverized coal fuel.



Oil

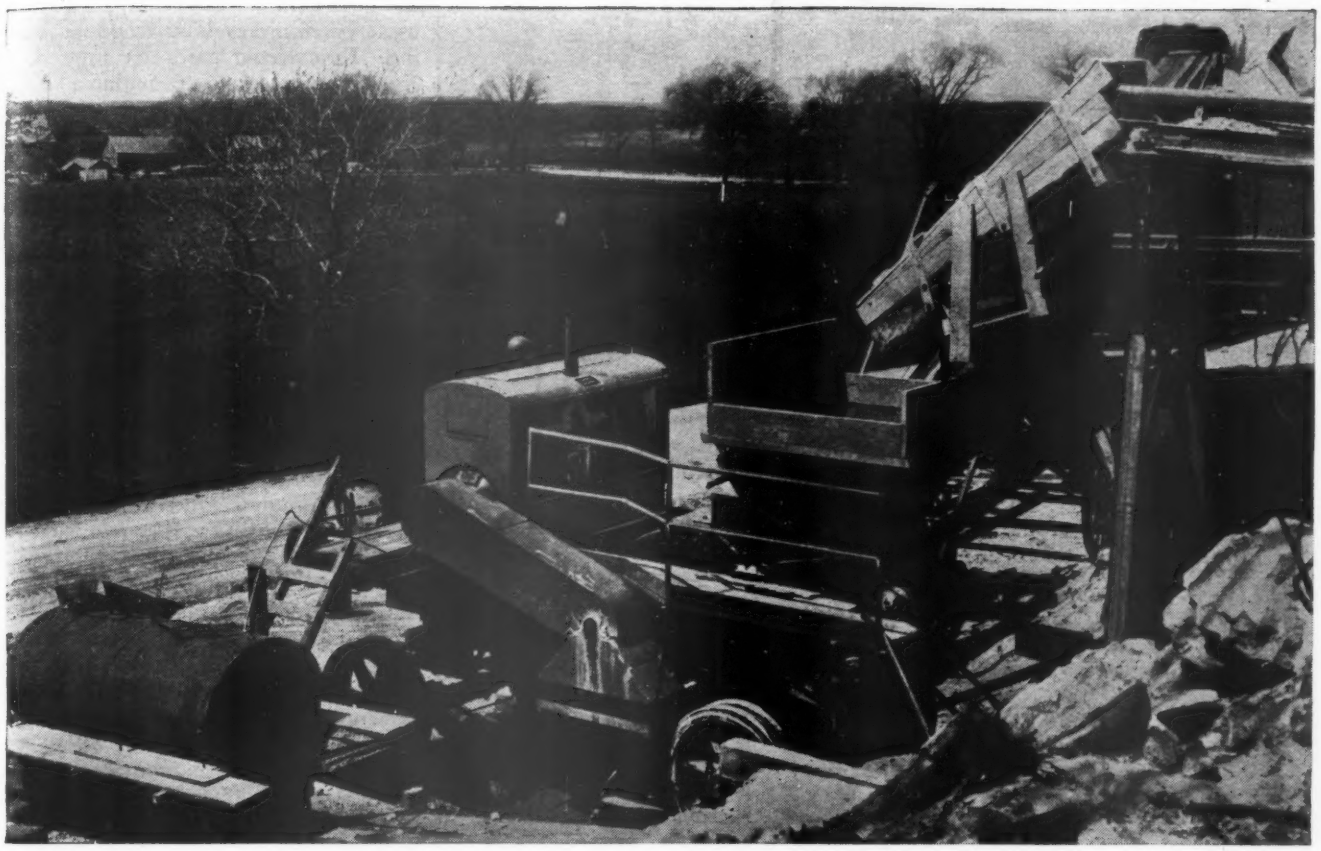
This fuel is more or less easily controlled because it is quite constant in chemical quality, and many types of simple flow meters may be placed into the oil line to the burners, and from which automatic control can be actuated. To obtain constant flow for any setting, constant oil temperature and pressure are required. It is furthermore of advantage to incorporate a static pressure gauge between each regulating valve and burner nozzle in order to detect any clogging of the nozzle orifice by subsequent build-up in back pressure. Figure 1 shows a simplified control diagram, and indicates the measuring point and control relationships. To simplify the diagram, the system assumes a high-oil-pressure atomizing burner. If air or steam is used for atomizing, a pressure regulating valve would be used in the main steam or air line. For automatic control, this regulating valve would be linked to the oil flow controller.

Producer Gas

Here air is used in changing the coal to a combustible gas mixture just as in pulverized coal firing, and so this air is included in the control set-up of this fuel. Supply of B.t.u. to the burners depends on the operating control as well as type of producer. Although the control diagram in Figure 2 pertains to a continuous mechanical producer, the arrangement, nevertheless, applies to any hand-fixed generator as far as one may wish to go.

Volume or flow measurement of hot, raw producer gas is difficult and undesirable. Measurement of static pressure of the gas flow leaving the producer has no quantitative meaning except to serve, as in the case of the pressure gauge ahead of the oil burner nozzle, as an indicator of plugging conditions in the burner or ports. It is best to measure gas flow indirectly by measuring air flow from or to the blower. This can readily be done by a differential pressure gauge measuring the pressure drop across an orifice plate, flow nozzle, or venturi constriction in a straight section of the fan inlet or outlet pipe, or across the inside and outside bend of an elbow in the line. A static pressure gauge in the fan discharge pipe has no quantitative value because of the variable resistance of the ash bed in the producer. It may be used as an indication of ash bed height or plugging conditions in the bed, at least to some extent. Flow, or rather relative flow, may also be simply indicated by a swinging baffle in the blower ducts, the position of this baffle varying with the mass velocity of the air, and which can be accentuated by a small sprocket and chain arrangement on a pointer mounted in front of a quadrant scale. Control of anti-clinkering gas, such as steam or kiln waste gas, can be had by measuring the temperature of the mixed blast, or using a continuous CO_2 meter and controller.

Mechanical producers, because of continuous fuel supply with interconnected gas temperature control, will produce a fairly steady B.t.u. flow to the burners. With hand-firing, and especially where high-volatile coal is used, fluctuations in



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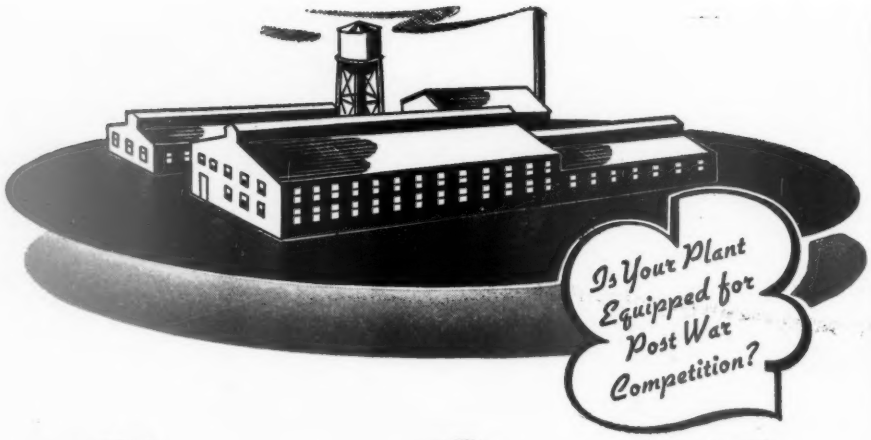

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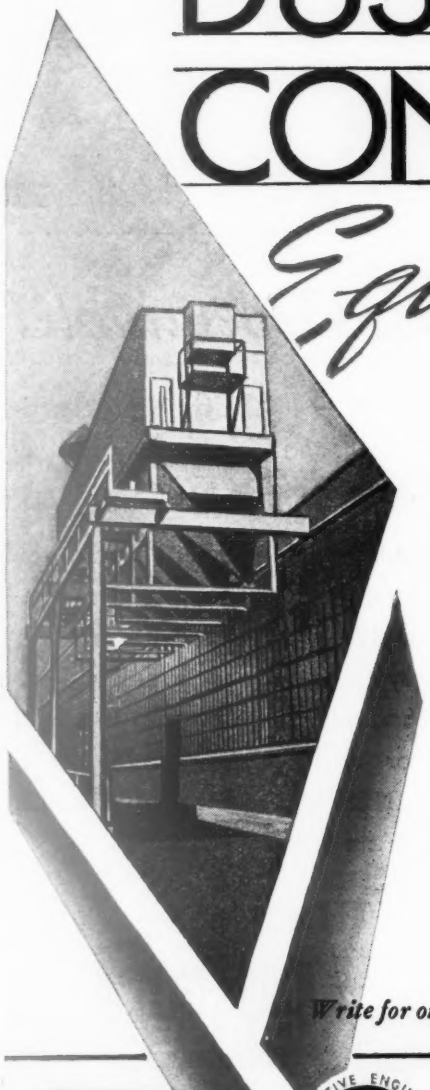

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the heat value of the gas appear and must be minimized by frequent firing. In extreme cases it may become desirable to provide a gas pressure controller in the gas line, which will reduce the blast pressure during the period of maximum distillation immediately after coal changing. All in all, if the blast volume is held constant along with the gas temperature (assuming good ash and coke-bed management), much progress has already been made.

Natural Gas

This fuel lends itself by far to the most simple and accurate type of control. Due to the constancy of chemical analysis and B.t.u. value, as well as due to the ease with which constant pressure may be maintained by simple pressure regulators, it is hardly necessary to use and orifice-type flow meter, as relative flow can be indicated directly for control purposes by the back pressure against drilled orfice nozzles. In all cases, however, where it is important to have accurate quantitative records of gas consumption, the installation of recording-type flow meter controllers is desirable. For the adjustment of individual burners from each kiln manifold, static pressure gauges between burner valves and nozzle orifices are much to be preferred to quadrant-type or positioning valves or cocks. Such gauges should be small, single-column or well-type mercury gauges which can be adjusted to zero reading in order to check with others on the line. The burner orifice (when the gas stream is not used for air induction) should be drilled to such size as to give full-scale readings when the valve is wide open at the working pressure. Each kiln should have its own pressure regulating valve. Figure 3 shows the essential features for burners which do not entrain some primary air.

Pulverized Coal

Coal in this form is most widely used for rotary kiln firing, although it has also been applied to some shaft kilns. Basically, control is not centered in adjustments of solid fuel feed to the grinding mill in constant quantity, but rather in the regulation of the density and mass velocity of the mixed coal-air stream to the burner. We may, therefore, compare it to control of producer gas, which is a combination control of air and fuel to produce a combustible mixture for the burner. Variables in ash content, moisture, and bulk density of the solid fuel supply have an even more pronounced ef-

fect on combustible stream to burner than that from gas producers.

Grinding mills may be roller, ball and ring, tube, or hammer mills in which air action for drying, classifying, transporting, and combustion is made an integral part of the fuel processing. It becomes obvious that this air must be controlled instantaneously with the weight of correctly-pulverized dust particles. Steady flow of potential B.t.u.s from mill to burner is not always easy to produce. Those variables which can be measured are being eliminated, the others, such as moisture and ash, must be reduced to a minimum by certain measures adaptable to each operation.

The amount or weight of coal dust that may be lifted out of a grinding mill in any one instant is not dependent on the amount of coal being fed to the mill at the moment, but is a function of the mass velocity (pounds per min.) of the air being sucked or blown into the mill. Due to variations in coal size and grindability, the mass velocity of the air must be varied with these or feed variations, or held constant with constant coal reduction or feed. For example, when the air temperature changes and becomes higher, the mass velocity of the air decreases because it is supplied from a constant-speed fan handling a fluid of changing density. This then causes a decrease in lifting power of the air. This decrease causes increased load in the mill and is reflected in an increase in resistance to the air passing through the mill, further decreasing air flow just as increased ash depth in gas producers reduces air flow. It is at once obvious that these conditions reflect in the B.t.u.s delivered by the mill to the burner despite the fact coal feed is constant. Control consists, therefore, in first measuring the air temperature, air velocity, and mill resistance under changing load, then providing a temperature controller and an airflow regulator in step with the coal feeder, and in controlling the mill resistance. Such mill feed control can be incorporated in many of the older-type mills, once the principle is understood, and so bring them more up to date.

Next month's discussion will treat control of combustion air, and then tie the combined fuel and air control problems together for both shaft and rotary kiln application. All this is not as simple as it may sound, but to bring order and understanding requires focusing on the main and fundamental points. It is hoped that the reader will make such allowance.

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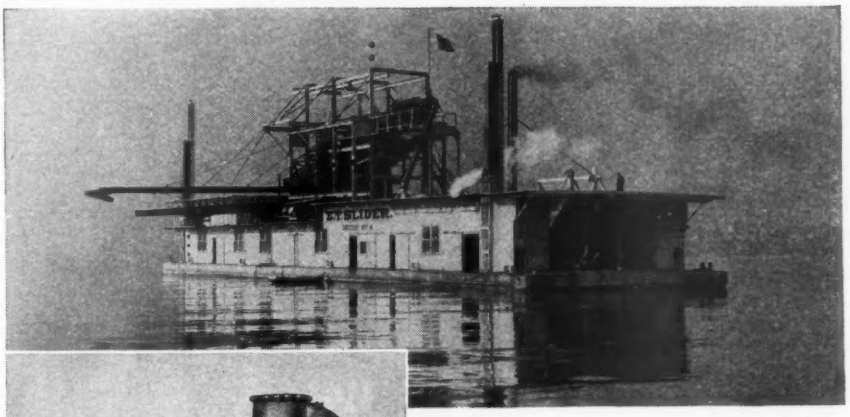

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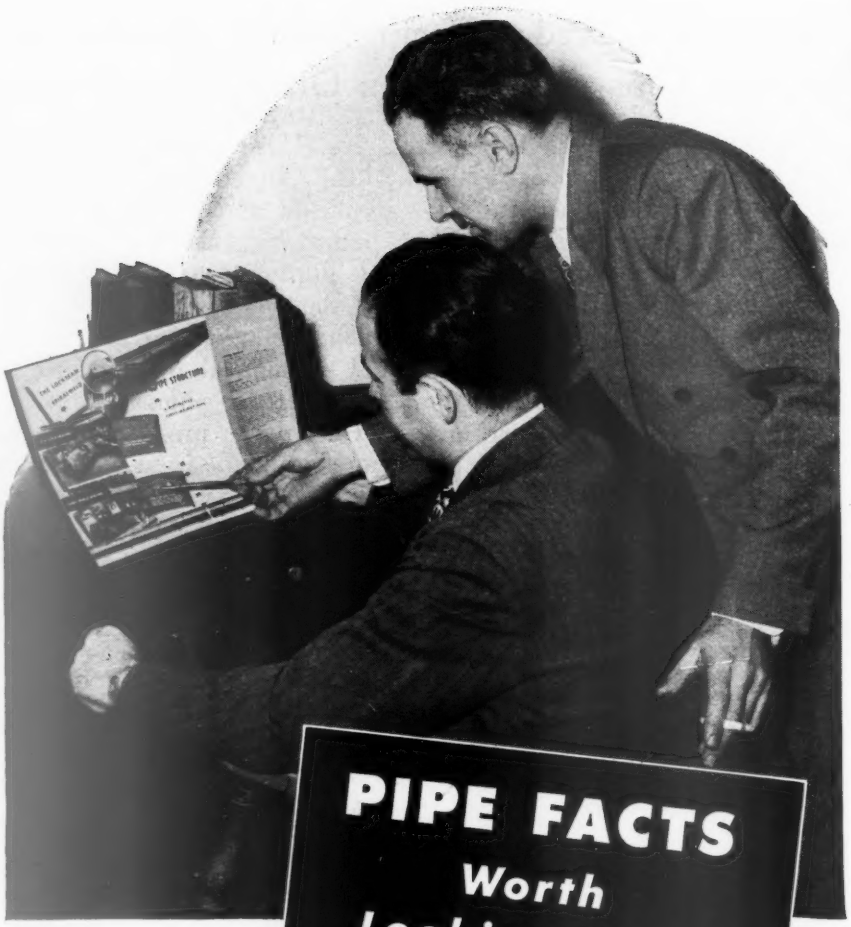

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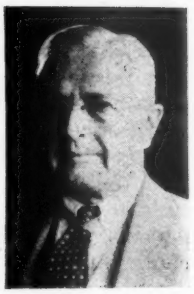
PERSONAL MENTION



A. D. Warner, Jr.

A. D. WARNER, JR., who served the Warner Company of Philadelphia as treasurer from 1902 until this year, retired from his duties after 46 years with the firm. Mr. Warner will, however, continue as vice-president in an advisory capacity.

CHARLES WARNER, JR., elected to succeed Mr. Warner in the office of treasurer, will continue his duties as secretary of the company.

T. E. STUMM became superintendent of the Bellwood, Ill., plant of the Consumers Co. on May 1. For 8 years Mr. Stumm had been superintendent of the company's Crystal Lake, Ill., sand and gravel plant and before that he was superintendent of the Aetna plant at Algonquin, Ill., which is now owned by Consumers.

The 40th anniversary of E. J. KRAUSE as president of the Columbia Quarry Company of St. Louis was appropriately observed on May 27 by members of the office force and superintendents, who honored their chief executive with a surprise celebration.

The addition of three new executives was announced today by H. E. Carney, Jr., president of the Carney Co., cement and rock wool insulation manufacturers of Mankato, Minn. They are: LAWRENCE MORRIS, personnel director; WILLIAM H. SCOTT, chief mechanical engineer; and CLAYTON BOWE, chief accountant.

ROY PEETS, the superintendent of operations at the Grand Rapids Gravel Co. of Grand Rapids, Mich., since 1920, will retire from his duties, but will continue to be associated with the firm in a consulting capacity. He will be succeeded by GEORGE BROCKER.

FRANK J. BARRETT, the district manager of the Portland Cement Association at Seattle, has been named a director of the Puget Sound Savings & Loan Association.

ERIC A. JOHNSTON, well known as the president of the United States Chamber of Commerce and president of the Motion Picture Association of America, was recently re-elected chairman of the directors' board of the Washington Brick & Lime Co., Seattle, Wash.

E. F. HABERKERN has been made assistant to the president of the Columbia Quarry Company of St. Louis. Mr. Haberkern was formerly associated with the National Supply Company, Superior Engine Division, for 12 years.

Irving Warner, Jr.

IRVING WARNER, JR., was recently named industrial engineer for all divisions of the Warner Company except the Bellefonte Division.

Mr. Warner served during recent hostilities as a lieutenant commander in the United States Navy. Before the war he had been affiliated with several industrial firms, including the General Electric Co.

DR. AUSTIN W. FISHER and DR. BRUCE S. OLD have joined the staff of Arthur D. Little, Inc., Cambridge, Mass., industrial research organization. Dr. Fisher will supervise chemical engineering research. Dr. Old, who served as a commander in the U. S. Navy Reserve, will engage in metallurgical research.

Following the acquisition, repair and improvement of a cement plant at Osborn, O., the Universal Atlas Cement Co., a United States Steel Corp. subsidiary, is establishing a new sales office at Dayton for Ohio and Kentucky.

JAMES C. MCCLURE, formerly district sales manager at Albany, O., has been appointed sales manager for Dayton. HARRY E. BERGOLD, field man at Albany,

J. C. McClure

H. E. Bergold

succeeds Mr. McClure as district sales manager there. Mr. McClure has been associated with Universal for the last 19 years. Mr. Bergold joined the Albany staff in 1941.

R. L. KILGORE has been appointed manager of the National Gypsum Company's largest rock wool plant at Alexandria, Ind. He has been successively cupola operator, foreman, superintendent and manager. Since 1937 he has been manager of the Dover (N. J.) plant. S. M. FISHER succeeds Mr. Kilgore at Dover.

C. J. LEWIS has been appointed technical director of the Warner Company of Philadelphia, reporting directly to the president. All technical development, research functions and laboratories of the firm will come under his direction.

FLOYD DIXON has become chief clerk of the Nebraska Cement Co. of Superior, Neb., a subsidiary of the Ideal Cement Co. He succeeds E. C. NOREN, who re-

THE combined research, production and distributing facilities of three famous companies are now offered to American industry by The Colorado Fuel and Iron Corporation. Thus, a new nation-wide service is made available in steel, wire products, and allied specialties under the trade-marks of Wickwire Spencer, Calwico, and CF&I—each a standard of industrial progress in its own right.

The East and Middle West will continue to be served by Wickwire Spencer Steel Division. The Colorado Fuel and Iron Corporation will serve the Plains and Mountain States with CF&I facilities as before plus the products of the eastern and western divisions. The California Wire Cloth Corporation (a subsidiary) will supply its own products and in addition the products of the other two divisions to Pacific Coast customers.

The well-earned reputation for quality which these three companies have enjoyed will be maintained in the new and greater Colorado Fuel and Iron Corporation.

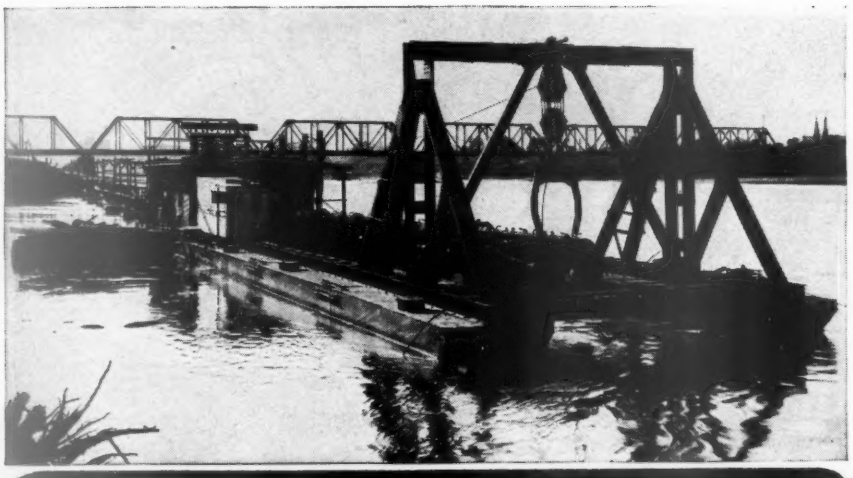
CF&I

WICKWIRE SPENCER STEEL DIVISION

The Colorado Fuel and Iron Corporation

THE CALIFORNIA WIRE CLOTH CORPORATION

EASTERN SALES OFFICES 500 Fifth Ave., N.Y. 18, N.Y.
EXECUTIVE OFFICES DENVER, COLORADO
WEST COAST OFFICES OAKLAND, CALIFORNIA
KEY CITY OFFICES SEE PHONE BOOK



"Our only regret is that we did not purchase our Eagle 'Swintek' ladder sooner!"

Thus wrote Kansas Sand Co. regarding the installation pictured above — 65′ heavy duty Eagle "Swintek" Dredging Ladder with 10″ pipe. The company's letter states further:

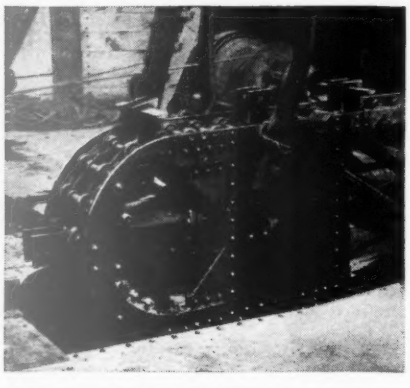
"After operating this cutter nearly six months, we can say that it is most satisfactory. Our output has increased nearly 40%, which is especially good as gravel is only 25% of our total production. We also note a reduction in power costs as well as repairs on dredge and pipe line equipment. In all, we are well pleased with this equipment and can recommend it to anyone in the sand and gravel industry."

The same regret — that the Eagle "Swintek" Dredging Ladder was not procured sooner — has been uttered by quite a number of users. Back of these expressions is the fact that this unit provides more profitable dredging — and in many cases has made dredging profitable where it was not possible with the equipment previously employed.

The Eagle "Swintek" Dredging Ladder readily works the lower depths which cannot be dredged with plain suction pipes. The best deposits usually lie at these lower levels. Manganese steel cutters on the traveling chain of the "Swintek" loosen and tear out the material, insuring the flow of a maximum proportion of solids into pipe line.

Both production and profits are substantially increased by this ladder, which is made in lengths from 25 to 80 feet, for dredging depths up to 60 feet and more.

Write for Catalog No. 745, which contains full information.



The cutters loosen deposit and assure maximum and uniform feed of solids. The traveling chain is a positive barrier against oversize entering the nozzle and clogging the pipe line; eliminating work stoppages and breakdowns.

EAGLE IRON WORKS
133 Holcomb Avenue, Des Moines, Ia.

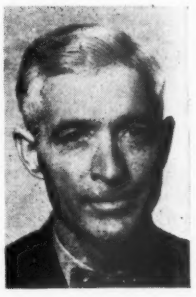
EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS

EAGLE IRON WORKS
DES MOINES, IOWA
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"

signed. The appointment became effective on June 1, 1946.

At the Hanover, Mont., Ideal plant, E. A. THOMY assumed the duties of chief clerk, succeeding J. R. GWIN, who was recently made chief clerk at Portland, Colo.

OBITUARIES



Vernon Taylor

VERNON TAYLOR, 56, safety supervisor of the California Portland Cement Co. of Colton, Calif., died on May 13 at his home in Fontana, Calif.

Mr. Taylor had been safety supervisor for the fire since 1945. During this period the California Portland Cement Co. won the P.C.A. safety trophy for operating throughout a full calendar year without a lost-time accident.

JOSEPH H. JACKSON, 52, vice-president of the Carbon Limestone Co. and of the Carbon Concrete Brick Co., died on May 26 at Youngstown, O., after a heart attack.

Mr. Jackson had been affiliated with the Carbon Limestone Company continuously since 1918.

CECIL KEITHLEY, 34, operator and superintendent of the Keithley Lime Co. of Troy, Mo., was crushed to death by falling rock at his quarry on June 11. Mr. Keithley fell 60 feet into the pit in a slide of newly blasted limestone, and was fatally injured by the rock mass which struck him.

LOUIS KRUEGER, 71, died at Cape Girardeau, Mo., after an extended illness. Mr. Krueger had been for the last 15 years an accountant for the Cape Girardeau Sand Co.

WILLIAM BLAIR, 48, an employee at the Kentucky Stone Co. plant near Upton, Ky., was killed on April 24 in an accident at the quarry. Although no one witnessed the fatal mishap, it was apparent that the victim, a maintenance man, was caught under a crusher while making adjustments. He was dead when found.

PHILLIP A. DULIN, SR., a veteran bauxite mine operator and founder of the Dulin Bauxite Co., died in Little Rock, Ark., on April 10. Before establishing the Dulin Bauxite Co. Mr. Dulin had owned and operated the Dixie Bauxite Co.

RAYMOND HOOTON, 66, died recently at his home in Greenfield, Ind. Mr. Hooton, who had been the operator of a gravel plant at Greenfield for the last 35 years, sold his business only ten days before his death.

J. STEWART ELWELL, director and sales manager of the Western Lime & Cement Co. of Milwaukee, died on May 20.

Legal Decisions

By LEO T. PARKER

●

Gravel Not Mineral

According to a late higher court decision sand and gravel are not minerals and, therefore, are excluded from lease contracts for miner rights. In *State ex rel. Commissioner of Land Office v. Hendrix,* 167 Pac. (2d) 43, reported May, 1946, the question presented the court was: Is gravel included in a lease which specifies oil, petroleum, gas, coal, asphalt and all other minerals of every kind or character in and under, and that may be produced from certain lands. . . . The higher court held in the negative, saying: "It was our conclusion that gravel is not a mineral. . . ."

What Are Wages?

A late higher court has held that the term "wages" means the *actual* amount of money received by employees. In *Giannettino v. McGoldrick,* 66 N. E. (2d) 57, reported May, 1946, it was shown that city officials deducted from the prevailing rate of wages to be paid asphalt workers a computed 10 per cent. representing the monetary value of vacation and pension benefits. The higher court held this deduction from minimum wage unlawful. In other words, the higher court held that vacation and pension benefit dues cannot be deducted from the legal and prevailing rate of wages.

Negligent Employee

Generally speaking, an employee who fails to use disease-protection appliances, provided by his employer, cannot recover either compensation or damages for an injury. For instance, in *Coburn v. North American Refractories Company,* 174 S. W. (2d) 757, it was shown that a grinder contracted silicosis. In subsequent litigation the higher court held that the employee's failure to use a respirator provided by the employer barred recovery of compensation unless the testimony proved conclusively that the employee's death was not caused by his failure to use the respirator. ~

Lease Held Valid

According to a late higher court decision, a corporation which leased premises for several years without objecting to provisions of a lease *cannot* cancel or terminate the lease. See the leading case of *Mutual Company v. Sewall,* 182 S. W. (2d) 575, in which it was shown that a corporation leased a lot for 99 years. Later the corporation constructed a building thereon and after occupying it for 20 years and paying the agreed rental, it filed a suit to terminate the lease on the ground that the lease was invalid. The higher court refused to hold in favor of the corporation. The legal effect of this decision is that operators who for any reason desire to terminate or cancel a lease should file a complaint without any delay.

PROTECT EYES WITH
WILLSON CUP GOGGLES

Two way ventilation inside lens through side screen and slotted ring keeps fogging to minimum.

The tougher the job, the more your men will appreciate the dependable protection of WILLSON RR50 cup goggles.

Heat treated Super-Tough* lenses in durable plastic eye cups, provide both front and side protection against steel chips, splashes of molten metal and similar hazards encountered in chipping, riveting, casting and such occupations. A specially designed resilient spacer ring under the lens provides a greater factor of safety when the lens is subjected to severe impact.

For utmost comfort in a goggle of this type, the eye cups are molded to fit the eye cavities. The nose bridge can be adjusted for correct spacing between the eye cups and does not ride the nose, while snug fit without pressure is assured by an adjustable headband. Dual ventilation gives through draft by means of a perforated sideshield, and over the lens surface through a slotted retaining ring.

*T.M. Reg. U. S. Pat. Off.

For help on eye protection problems get in touch with your Willson distributor or write direct to Willson Products, Inc., 102 Thorn St., Reading, Pa.

WILLSON 75 YEARS

DOUBLE WILLSON
PRODUCTS INCORPORATED
READING, PA., U.S.A. Established 1870

Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—Ed.]

Legal Editor, PIT AND QUARRY: I want to know a few points of law. My workman was injured and badly too when he stuck his hand in my machine. He has worked on the machine two years. What can I do about this?—P. C.

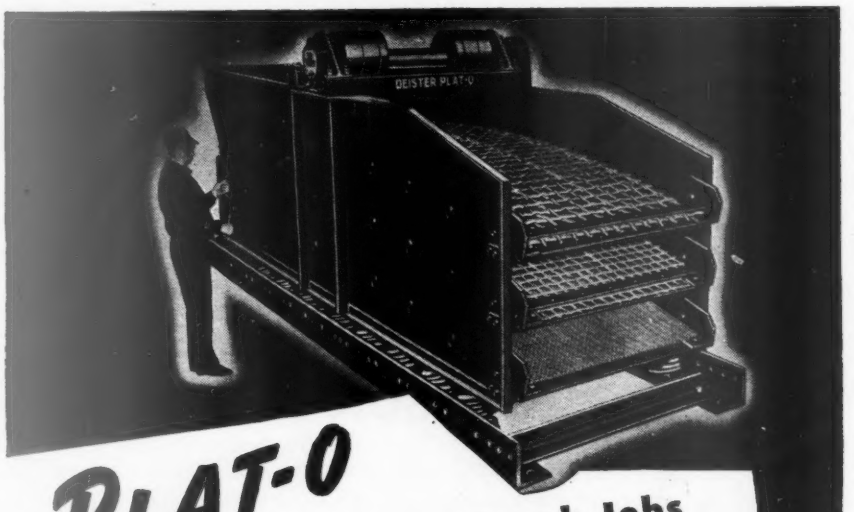
Answer: The higher courts now hold that all employes assume the "natural" risks of their employment.

For example, in *De Haas v. Cascade, Inc.,* 162 Pac. (2d) 284, reported December, 1945, the testimony showed that an employee had worked on a machine for several days and was fully acquainted with its operations. He was severely injured and he sued his employer for damages. The higher court refused to allow any damages, saying:

"The dangers incident to his task were open, obvious and evident, and were assumed by him."

Also, see *Cummins v. DuFualt,* 18 Wash. (2d) 274, 139 P. (2d) 308, 315. In that case the employee was injured when he fell from a tramway. He knew of the conditions surrounding the place of work. In holding that he assumed the risk of the danger incident to the work he was doing, this court stated:

"If the condition of the walk contributed to his fall, it was a condition which he assumed when he undertook the task assigned to him."



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Handles the Tough Jobs with Less Maintenance

You don't have to "ride herd" on Plat-O Vibrating Screens to get top tonnage—accurately sized. Rugged, reinforced construction, and simplified, two-bearing design permit the Plat-O Screen to take the tough grading jobs in its stride . . . to handle *more* material, *more* accuratedly graded . . . and do it with far *less* maintenance and screen cloth changes. Write today for full information on the eight Plat-O features which assure you *better sizing—cheaper* on the toughest screening jobs.

DEISTER MACHINE COMPANY
Fort Wayne 4, Indiana

PLAT-O by DEISTER

TRAFFIC News Digest

CENTRAL FREIGHT ASSOCIATION DOCKET

Docket 80272—(2)—Cement, common, hydraulic, masonry, mortar, or Portland, carload minimum weight 50,000 pounds, except when the marked capacity of car is less, in which event the marked capacity of car will be minimum weight, but in no case less than 40,000 pounds; cement clinker, carload minimum weight 50,000 pounds. Establish on, from Limedale and Mitchell, Ind., to Conway, Va., 21 cents.

Docket 80293 (2)—Limestone, agricultural (not ground or pulverized), in open-top cars in bulk only, carload minimum weight 90 per cent. of marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Carey, O., to representative points in Indiana, rates as shown in exhibit C.

EXHIBIT C

Proposed rates (representative), to Indiana points

To	Rates in cents per ton of 2,000 pounds
Muncie, Marion, Wabash, Claypool, Warsaw, Leesburg, Milford, New Castle, Atwood	138
Fair Oaks, Schneider, Oxford, Handy	182
Monon, Otis, Shelby, Valparaiso, Dayton, LaFayette, San Pierre	171
Monticello, Wanatah, LaPorte, Walkerton, Knox, Frankfort	160
Decatur	116
Huntington, Ft. Wayne, Red Key, DeSoto, Hartford City, Columbus City	127
Rochester, Hibbard, Tipton, Fairfield, Cassville, Peru	149
Bluffton, Portland	121

Docket 80349 (1)—Sand, all kinds, and gravel, in open-top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Stockport, O., to Marietta, O.; 44 cents to meet local river competition.

CENTRAL FREIGHT ASSOCIATION DOCKET

Docket 80479 (1)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, ground, loam, moulding-bonded, naturally or otherwise, polishing, pulverized or silica), or gravel in open-top cars, carload minimum weight 90 per cent. of marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Cancel the present rates of 88 cents per net ton on, from Warsaw, Ind., to Elkhart, Ind.

FROM CENTRAL FREIGHT ASSOCIATION TERRITORY TO WESTERN TRUNK LINE COMMITTEE TERRITORY

Docket 80471 (2)—Limestone (unburned), ground or pulverized, carload

minimum weight 90 per cent. of marked capacity of car, except that when loaded to full visible capacity, actual weight will apply, but not less than 60,000 pounds. Establish on, from Piqua, O., to representative points in Iowa. Minnesota and Wisconsin, rates as shown in Exhibit A.

To	Proposed rates in cents per net ton
Ackley, Ia., Alma Center, Wis., Marshalltown, and Waverly, Ia.	$3.47
Brighton, Ia., Kewaunee, Wis.	3.03
Carnforth, Oskaloosa, and Waterloo, Ia., Sturgeon Bay, Wis.	3.36
Cedar Rapids and Delaware, Ia., Iola, Wis.	3.14
Dewitt, Ia.	2.92
Gifford, Hampton, Iowa Falls and Mason City, Ia.	3.58
Maplewood, Wis.	3.25
Owatonna, Minn.	3.91

CENTRAL FREIGHT ASSOCIATION DOCKET

Docket 80466 (2)—Sand, moulding, bonded (naturally or otherwise), in all kinds of equipment, carload minimum weight 90 per cent. of the marked capacity of the car, except that when car is loaded to full visible or cubical capacity, actual weight will apply, but orders will not be accepted for closed and open-top cars of less marked capacity than 60,000 pounds and 80,000 pounds, respectively. Establish on, from Minco, Mich., to the following points:

Chatham, London and St. Thomas, Ont.	$3.25
Galt, Guelph, Preston, St. Catharines and Welland, Ont.	3.52
Montreal, Que.	5.61
Orillia, Ont.	5.06
Oshawa, Ont.	4.51
Walkerville and Windsor, Ont.	2.42

Docket 80486 (1)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding or silica) and gravel, in open-top cars, carload minimum weight 90 per cent. of marked capacity of car except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Montezuma, Ind., to Metcalf, Ill., 69 cents per net ton.

Docket 80494 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel, carload in open-top cars, minimum weight 90 per cent. of the marked capacity of car, except that when car is loaded to full cubical or visible capacity, actual weight will apply. Establish on, from Irving, N. Y. to Erie, Pa., 88 cents per net ton.

SOUTHERN FREIGHT ASSOCIATION SUBMITTALS

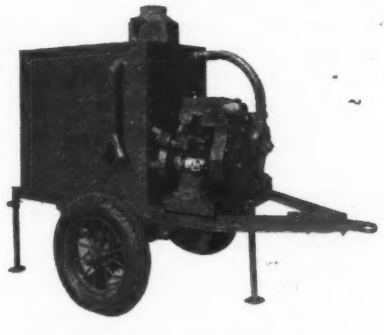
Docket 35112 (carrier) Publish rates on clay, viz.: ball, crude, china or potters in bulk or in packages, carload 80,000 pounds, but not in excess of marked capacity of car (import), in cents, ton 2,000 pounds, as follows:

From	To Erwin, Tenn.	To Kingsport, Tenn.
Baltimore, Md.	480	480
Philadelphia, Pa.	520	520
New York, N. Y., Trenton, N. J.	560	560

Docket 35155 (shipper; suggested by carrier)—Publish on wet phosphate rock,

DRILL *without* DUST

KADCO EQUIPMENT Reduces Costs Eliminates Hazard



Use KADCO Dust Control equipment on your rock drills for greater drilling footage—less blacksmithing—longer tool life—better working conditions. Available in a wide range of sizes for all operations. For sale or lease.

Write for Information

KADCO CORPORATION
LONG ISLAND CITY, N. Y.

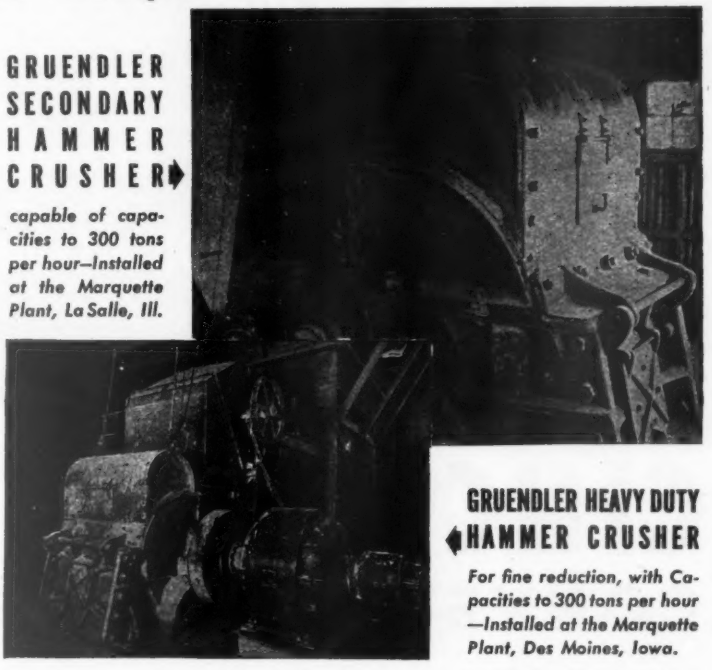
GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 60 YEARS

More Efficient Raw Grinding to ½" minus with a Gruendler

to increase the Capacity of your Ball or Compeb Mills as much as 30%

GRUENDLER SECONDARY HAMMER CRUSHER

capable of capacities to 300 tons per hour—Installed at the Marquette Plant, La Salle, Ill.



GRUENDLER HEAVY DUTY HAMMER CRUSHER

For fine reduction, with Capacities to 300 tons per hour —Installed at the Marquette Plant, Des Moines, Iowa.

Our 60th Year

Two additional Gruendler Secondary Hammer Crushers, have been recently installed by The Dewey Portland Cement Company.

Modern Cement Plant Operators are finding that the Gruendler Primary and Secondary Crushers (capacities up to 300 tons per hour), are highly efficient in raw grinding. This method of preliminary grinding not only produces a uniform fine product ½" minus, but when fed to the Finishing Mills at this fineness, it generally increases the Mill output 30% or more.

Continuous Peak Production is yours with the GRUENDLER METHOD of preliminary Crushing.

Illustrated Bulletins Mailed on Request

GRUENDLER
CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

to be dried, dried and mixed, dried and ground or dried, mixed and ground, and reshipped via the S.A.L. Railroad, a net transit rate of 11 cents per ton, 2,240 pounds, Homine, Nichols, Phosmico and Pierce, Fla., to Cornet, Fla.

Docket 35169 (shipper; suggested by carrier)—Establish rate of $7.44 per gross ton on phosphate rock, ground or not ground, Florida mines to Ohio and Big Rock, Ill.

Docket 35116-I (carrier)—Publish rate of 713 cents net ton, clay, crude or ground, carload, 60,000 pounds, Bath-Langley, S. C., and Huber, Reids, Ga., to Midland, Mich.

SOUTHWESTERN FREIGHT BUREAU DOCKET

Docket 39154 (2)—Agricultural limestone, etc., Sallisaw and Marble City, Okla., to Fort Smith, Ark. A. Establish from Sallisaw, Okla., 35 cents per ton of 2,000 pounds on agricultural limestone having value only for soil treating purposes and 68c per ton on limestone, crushed or ground in bulk or in bags, minimum weight as shown in Item 180, SWL Tariff 162-S.

B. Establish from Marble City, Okla., 55 cents per ton on crushed stone (will not apply on crushed stone in box cars or other closed equipment nor on ground or pulverized stone in any kind of equipment) also on agricultural limestone, carloads, having value only for soil treating purposes, and 91 cents per ton on limestone, crushed or ground, in bulk or in bags, minimum weight as shown in Item 180, SWL Tariff 162-S.

Docket 39228 (2)—Lime, Mosher and Ste. Genevieve, Mo., to Port Chalmette, La. To specifically publish in Item 8345-B, S.F.T.B. Tariff 382-D, rate of 384 cents per ton of 2,000 pounds, on lime, common, in bulk, minimum weight 80,000 pounds, carloads, from Mosher and Ste. Genevieve, Mo., to Port Chalmette, La.

Docket 39258 (2)—Silica sand and silica sand pit strippings, Missouri to Terre Haute, Ind. To establish a rate of $2.09 per net ton on silica sand and silica sand pit strippings, from Crystal City, Crystal Junction, Gray Summit, Festus, Hermann, Pacific, Sand Pit and Silica, Mo., to Terre Haute, Ind.

SOUTHWESTERN FREIGHT BUREAU DOCKET

Docket 39290 (1)—Sand, moulding, bonded, Lexington, Tenn., to Kansas City, Mo. To establish joint through commodity rate of 352 cents per ton of 2,000 pounds on moulding sand, in carloads, as described in Item 517, Southwestern Freight Tariff Bureau, Tariff 388-F, from Lexington, Tenn., to Kansas City, Mo.

Docket 39291 (2)—Chat sand, Webb City, Mo., to Centralia, Ill. To establish a rate of $2.86 per net ton on chat sand, from Webb City, Mo., to Centralia, Ill.

TRUNK LINE ASSOCIATION DOCKET

Docket 43524 (shippers)—Lime, common, hydrated, quick or slaked, carload, from Accord, N. Y., to D.&H. Railroad stations: Binghamton, Port Crane, Sanitaria Springs, Tunnel and Harpursville, N. Y., $3.30 per net ton, minimum weight 30,000 pounds and $2.64 per net ton, minimum weight 50,000 pounds. To Nineveh, Afton and Bainbridge, N. Y., $3.19 per net ton, minimum weight 30,000 pounds and $2.53 per net ton minimum weight, 50,000 pounds. Reason: Comparable with rates apply from and to other points.

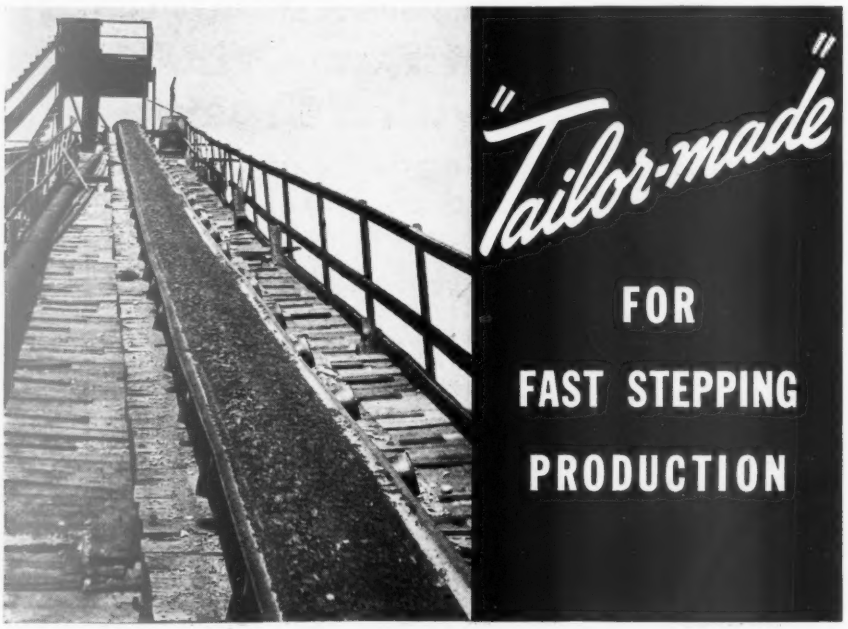
Docket 43532 (shippers)—Slag (not suitable for the further extraction of metal), carload, minimum weight 90 per cent. of marked capacity of car, etc., to Plattsburg, N. Y., from Easton, Pa., $2.86 per net ton, and from Bethlehem, Catasauqua and Hokendauqua, Pa., $2.75 per net ton. Reason: Comparable with rates applying from and to other points.

TRUNK LINE ASSOCIATION DOCKET

Docket M-4920—(shippers)—Limestone, crude, fluxing, foundry, or furnace, in open-top equipment, carload minimum weight 90 per cent. of marked capacity of car, etc., from P.R.R. Stations: Rambo, Devault and Blue Bell, Pa., and Reading Co. stations: Cedar Hollow, Shainline, Exton, Howellville, Swedeland, Williams and Mill Lane, Pa., to Bethlehem, Pa., 86 cents, Sparrows Point, Md., $1.15 and Steelton, Pa., $1.11 per gross ton. Reason: Comparable with rates applying from and to other points.

Docket 43546 (shippers)—Limestone, broken, crushed, ground or pulverized, carload, minimum weight 60,000 pounds, from Watertown, N. Y.

To Genesee & Wyoming Railroad	Rates in cents per 2000 lbs.
10 Taylor, N. Y.	187
20 Iverness, N. Y.; 30 Retsolf, N. Y.; 35 Greigsville, N. Y.	193
Prattsburg Ry. Corp.	
15 Marshalls, N. Y.; 20	



CINCINNATI
CONVEYOR BELTS

are "made-to-order" for today's peak production requirements. Dependable . . . steady . . . they "deliver the goods". The cover and carcass of these belts are combined into a hard-working team that conveys BIG TONNAGE at a LOW BELT COST per TON. Why not make your next conveyor belt a CINCINNATI BELT.

CINCINNATI
RUBBER MANUFACTURING CO.
Cincinnati, Ohio

	Wheeler, N. Y.; 25 Renchans, N. Y.; 35 Stickneys, N. Y.; 40 Beans, N. Y.; 45 Prattsburg, N. Y.	215
	Unadilla Valley Ry.	
15	River Forks, N. Y.; 20 Leonardsville, N. Y.; 25 West Edmeston, N. Y.; 30 Sweets, N. Y.....	171
35	South Edmeston, N. Y.; 40 New Berlin, N. Y.; 45 Davis Crossing, N. Y.; 50 So. New Berlin, N. Y.; 55 Holmesville, N. Y.; 90 Edmeston, N. Y.	182
65	Rockwells, Mills, N. Y.; 70 Mount Upton, N. Y.; 75 Rockdale, N. Y.; 85 Pittsfield, N. Y.....	187

In lieu of current 6th Class rates. Reason: On the same basis as applicable from and to other points.

TRUNK LINE ASSOCIATION DOCKET

Docket 43580 (shippers)—Slag, coke oven, in bulk, in open-top equipment, carload, minimum weight 90 per cent. of marked capacity of car, etc., from Martin and Grays Landing, Pa., to Lynchburg, Va., $2.86; Roanoke, Va., $2.75; Norfolk, Va., $3.19; Richmond, Va., $2.64 per net ton, in lieu of current classification basis. Reason: On same basis as presently applicable from and to other points.

Docket 43581 (shippers)—Crude, gypsum, rock, carload, minimum weight 90 per cent. of marked capacity of car used, but not less than 80,000 pounds, from Weehawken, N. J., to Howes Cave, N. Y., $2.00; Security, Md., $2.31 per net ton (rates do not include loading of cars by carrier), in lieu of current 6th class rates. Reason: Comparable with rates applying from and to other points.

Docket M-4931 (shippers)—To establish rates on limestone, unburned, ground or pulverized, carload minimum weight 60,000 pounds, to various points in the States of Ohio, Michigan, Illinois, Indiana and Kentucky, viz.: Akron, O., Ann Arbor, Mich., Butler, Ind., Chicago, Ill., Dayton, O., Detroit, Mich., Indianapolis, Ind., Louisville, Ky., Massillon O., and various others from Buchanan, Miles, Austinville, Ripplemead, Kimballton, Kerns, Pounding Mill and Falling Springs, Va., and Snow Flake, W. Va., on basis of I.C.C. docket 25220, Carriers' Revised Scale, and from Rocky Point, Va., the same rates as proposed from Buchanan, Va. Reason: On usual basis as currently applicable from and to other points.

WESTERN TRUNK LINE NEW APPLICATIONS

Docket E-8-639—Clay, crude or ground, carload minimum weight 60,000 pounds, from Mills, Wyo., to stations in Louisiana and Mississippi. Proposed—Same rates as recently approved in Western Trunk Line Application 8-570, from New Castle, Medicine Bow and Rock River, Wyo.

Docket E-41-748—Silica sand and silica sand pit strippings, carload minimum weight 90 per cent. of marked capacity of car except that when car is loaded to full visible or cubical capacity, actual weight will apply, from Crystal City, Crystal Junction, Gray Summit, Festus, Hermann, Pacific, Sand Pit and Silica, Mo., to Terre Haute, Ind. Proposed—$2.09 per net ton.

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices
Prompt shipments
CHICAGO PERFORATING CO.
2435 W. 24TH PLACE CHICAGO, ILL.
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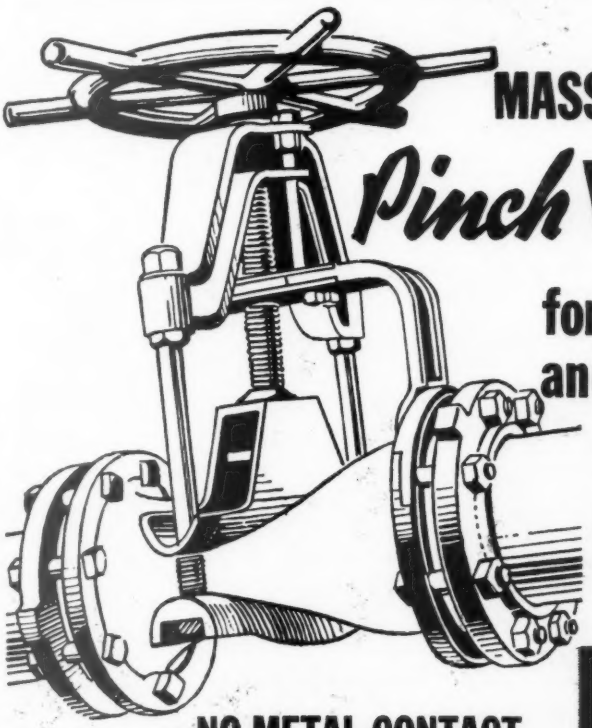


MASSCO-GRIGSBY

Pinch VALVES

for CORROSIVE and ABRASIVE Pulps & Liquids

NO METAL CONTACT

Successfully used for transporting abrasive and/or corrosive pulps and liquids . . wherever severe wear makes replacements of metal type valves too costly.

Depending upon use, the collapsible sleeve is supplied in either rubber, Neoprene or other synthetics. The valve fits tight, even on solid particles: it contains no packing glands; freezing does not destroy it.

SIZES — 1", 2" and 3" for continuous pressure to 100 lbs.; 4", 6", 8", 10" and 12", up to 150 lbs. When writing please state your specific problem.

MARCY Ball, Rod and Tube Mills; Genuine WILFLEY Tables; Rock Bit Grinders; Belt Feeders; Density Controllers

DENVER
SALT LAKE CITY
EL PASO
NEW YORK CITY

The Mine & Smelter Supply Co.

CANADIAN VICKERS, LTD. MONTREAL
W. R. JUDSON SANTIAGO, LIMA

TRADE NOTES

L. P. Darnell, who was formerly sales manager of the Cincinnati Rubber Company, has been promoted to the office of vice-president and general manager of the company.

H. E. Rollin

Pioneer Engineering Works of Minneapolis has announced the consolidation of all its service activities under Harold E. Rollin, manager of sales engineering.

Mr. Rollin, who entered the employ of Pioneer in February, 1929, was successively a draftsman, chief draftsman, chief engineer, night superintendent of the shops and manager of sales engineering.

The Euclid Road Machinery Co. of Cleveland, O., has announced the following appointments:

H. W. Hiscox, sales representative for Virginia and West Virginia and assistant for the export department; Thomas A. Cantrell, in charge of field engineering; George M. Perry, assistant to P. H. Malenchini, export department manager.

T. A. Cantrell

H. W. Hiscox

G. P. Torrence

George P. Torrence will rejoin the Link-Belt Co. of Chicago on July 1 as executive vice-president, according to an announcement released by the company.

Mr. Torrence, who was president of Link-Belt from 1911 to 1936, has been vice-president and general manager of the Rayon Machinery Corp., a subsidiary of the Industrial Rayon Corp., and president of the Cleveland Pneumatic Tool Co. since his resignation from Link-Belt. He will again become president of Link-Belt on November 1, 1946, when William C. Carter will retire from this office.

PULVERIZERS

Hundreds of Installations . . Use Bradley Pulverizers

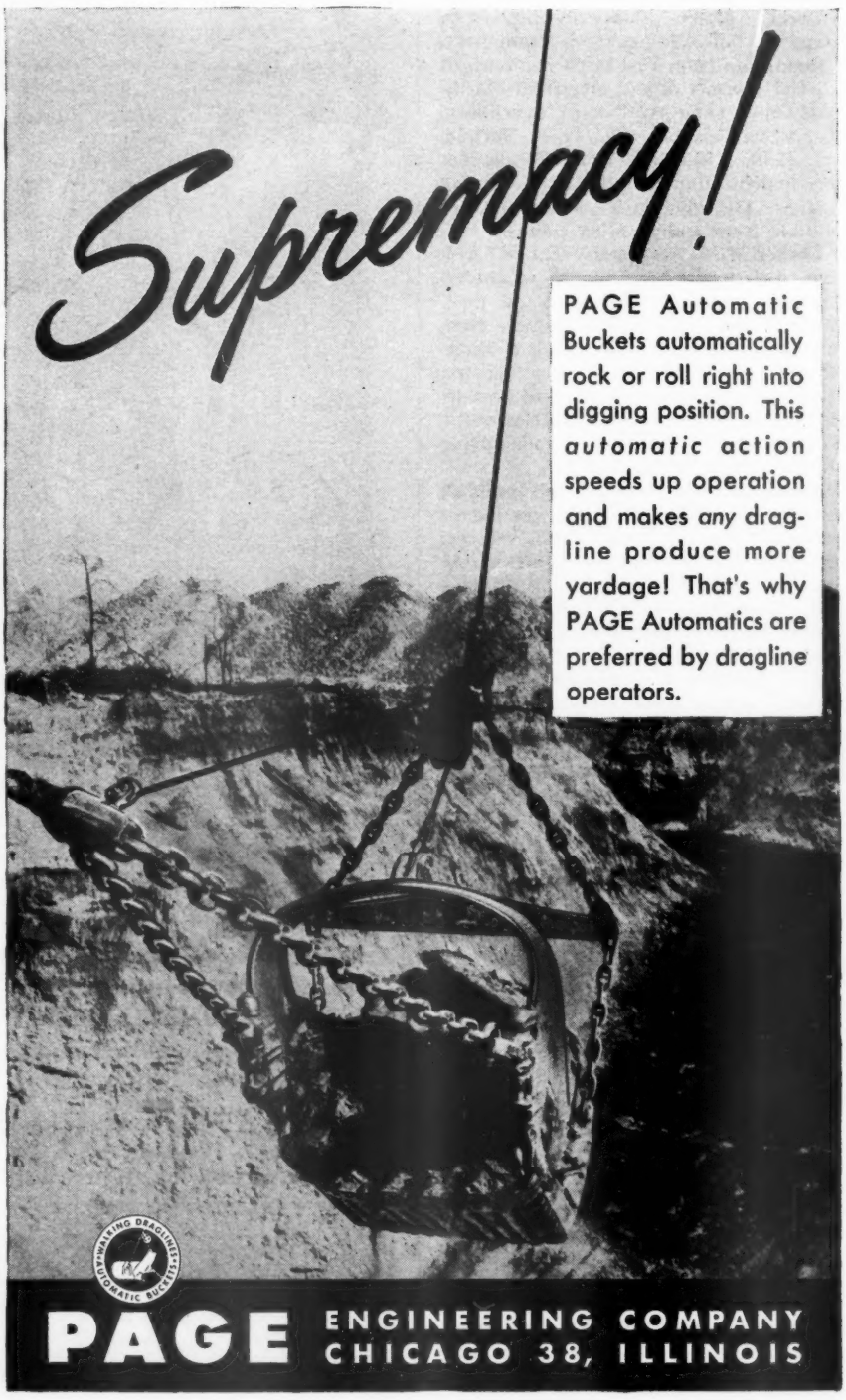
for the reduction of

AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.

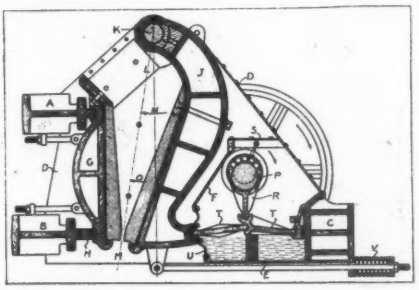

Supremacy!
PAGE Automatic Buckets automatically rock or roll right into digging position. This automatic action speeds up operation and makes any dragline produce more yardage! That's why PAGE Automatics are preferred by dragline operators.
PAGE
ENGINEERING COMPANY
CHICAGO 38, ILLINOIS

NEW MACHINERY and SUPPLIES

● Jaw Crusher

The principle of "crushing without rubbing" employed in Straub Manufacturing Company double jaw crushers has now been incorporated in a new single jaw Simplex crusher. By referring to the sectional view on this page, one notes the following features of the new crusher's construction.

The swing jaw (J) hangs freely on the large hinge pin (K), which is firmly secured in the frame. Oil bath lubrication is provided at this point. Due to the location of the hinge pin (on the

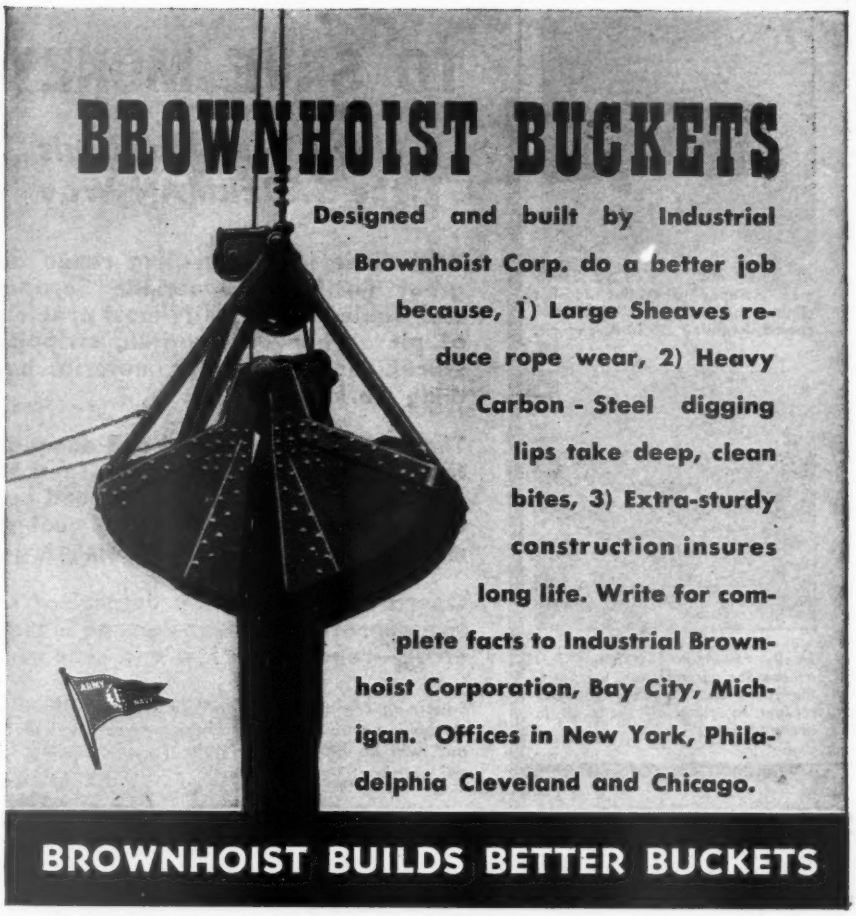


New double jaw crusher.

line LM), the jaw motion is such that the rock is crushed squarely, a fact which the maker claims materially reduces slippage, rubbing and attendant wear of jaw plates.

The heavy eccentric shaft (P) which operates the crusher is mounted in two giant self-aligning roller bearings pressed into the steel side frames. It has an exceptionally long "throw" on the eccentric, permitting the two toggles (T) to be set in a relatively flat position. These toggles are inverted and impart the crushing stroke to the swinging jaw when pressed down by the pitman (R). This light strong steel member is always in compression, with the upper end bearing against the lower side only of the eccentric shaft. Its lower end rests in a groove formed on top of the rear toggle and does not pass between or through the toggles. Reducing the size and weight of the pitman makes possible the use of a long-stroke eccentric, flatter toggles and greater leverage, combined with low pressures on shaft and pitman bearings. These features, the manufacturer states, permit operation speed as high as 350 to 400 crushing strokes per minute. This crusher has only one relatively small and lightweight driving pulley. An oil-resistent flexible diaphragm (U) seals the opening in the oil bath, while permitting free movement of the toggles and swing jaw.

By causing the pulley to drive through an overload safety device built into the hub, rather than through the shaft, the designers gained protection against "tramp iron" or severe overload. The


BROWNHOIST BUCKETS
Designed and built by Industrial Brownhoist Corp. do a better job because, 1) Large Sheaves reduce rope wear, 2) Heavy Carbon - Steel digging lips take deep, clean bites, 3) Extra-sturdy construction insures long life. Write for complete facts to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia Cleveland and Chicago.
BROWNHOIST BUILDS BETTER BUCKETS

MATERIAL HANDLING

Material handling is a dirty job for both men and machines . . . but it isn't too dirty or too tough for Wisconsin Heavy-Duty Air-Cooled Engines. This Jeffrey Model 209B Portable Scraper Conveyor, powered by a Wisconsin 4-cylinder air-cooled engine, is made by Jeffrey Mfg. Co., Columbus, Ohio.

If your equipment requires rugged, dependable power within a range of 1 to 30 hp., you can't do better than to specify "Wisconsin".

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy Duty Air-Cooled Engines

At cement mill, a ½ cu. yd. Sauerman Scraper stockpiles red-hot clinker and reclaims clinker when cooled, handling 135 bbls. an hour.

Small Sauerman Scraper strips overburden from rock deposit. Elevated bridle cable enables scraper to place all the spoil in one high pile.

TO SAVE MONEY!

Move Your Materials the SAUERMAN Way

With their long operating range and great flexibility, Sauerman Scrapers and Cableways simplify most problems of pit or bank excavation, stripping, stockpiling and similar material handling work.

These machines dig, haul and dump automatically in one operation. They are adaptable to a variety of ground conditions and come in sizes to meet almost every capacity requirement.

Operator has finger-tip control of entire operation—power demand is moderate—repairs are few and simple.

Sauerman engineers will gladly study your digging or stockpiling problems. Their advice may save you money and will be given free. Write for our catalog and tell us about your problems.

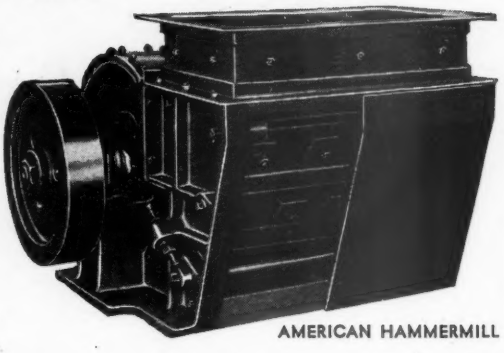
SAUERMAN BROS., Inc.
534 S. Clinton St., Chicago 7, Illinois

YOUR OPERATION IS ONLY AS FLEXIBLE AS YOUR CRUSHER

American Crushers Offer You the Flexibility You Need

Reduction of "one man" size stone or screen rejects to aggregate, roadstone, or agstone sizes in one operation proves American's flexibility.

Crushed uniformly to round and cubical shape, the product contains no slivers or finger stones. Provides great flexibility for change of size and runs.



AMERICAN HAMMERMILL

You'll find this dependable crushing unit — powerful — with endurance to withstand severe use for constant runs. Resistant to clogging. . . . Capacities up to 250 TPH.

Write for Detailed Information

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1059 MACKLIND AVE. ST. LOUIS 10, MO.

wholly-sealed crusher is of all-steel construction, with manganese fittings.

The lubrication system includes a positive-type pump, driven from the end of the crusher shaft and detachable for inspection. A pressure switch automatically shuts down the motor whenever the oil pressure falls below a certain point. At one-minute intervals about five gallons of clean oil passes through the lubrication system, pouring down from the manifold (S) over the shaft, pitman and toggles.

● Industrial Gun

Built upon new principles, but firing extra-heavy shotgun ammunition, the new industrial gun developed by the Remington Arms Co., Inc., Bridgeport, Conn., may play an important part in

Used for removing kiln clinkers.

commercial manufacturing activities, as well as in the sporting fields.

The Remington industrial gun is of particular value in cement manufacture. In past years, when clinker rings were formed in cement kilns, it was necessary to remove them with sledge-hammers or water bars. This method necessitated shutting down the kiln to allow it to cool. Valuable hours were consumed in cooling the kiln and reheating it, and thus production costs were increased.

One man fires gun with lanyard.

The industrial gun, according to Remington, saves time, labor and expense.

The firearm is furnished with a heavy steel bracket or bolster, which may be mounted permanently on an I-beam at the opening of the kiln, or in a corresponding fixed position for other in-

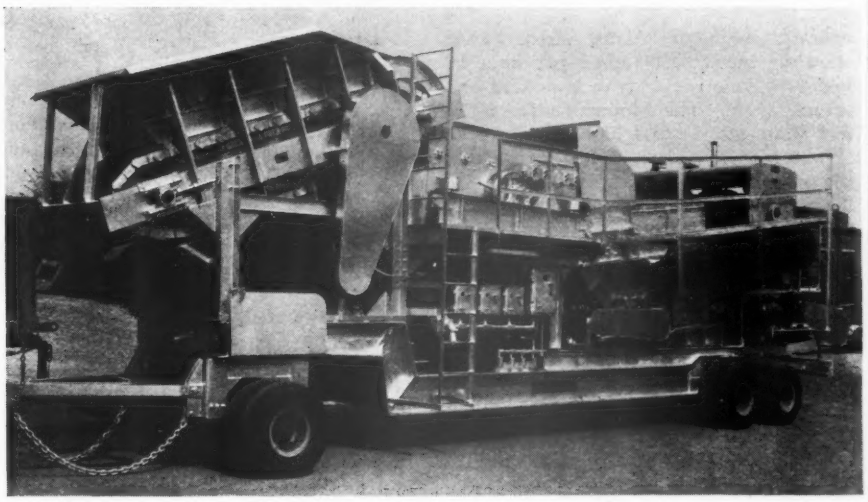
dustrial uses. It can be adjusted horizontally by the use of a hand crank and vertically by means of a hand wheel.

Only one man is required to operate the industrial gun. When a clinker ring is beginning to form in a cement kiln, only a few minutes are required to close down the operation, mount the Remington Industrial Gun and destroy the ring with well placed shots. It is easier to remove the clinker ring when the kiln is at maximum heat.

The gun fires a shell of approximately 8 gauge in size, loaded with a 3-ounce lead projectile which develops a muzzle velocity of more than 1,600 feet per second and a muzzle energy of 7,475 foot-pounds.

The shooter cuts a "key-way" through the clinker ring with a few well-spaced shots. The kiln is then rotated. Loss of the arch key ("key-way") generally causes the ring to fall. If this is not the case, however, a few additional shots along the junction of the ring with the kiln lining will produce the desired results.

The gun weighs 92 lbs., is equipped with an automatic ejector, and is fired by pulling a lanyard; it cannot be fired until the action is completely closed. It can also be used for scaling the walls and ceilings in mines and for removing protruding rocks.



Electrically operated portable crushing plant.

● Portable Plant

A portable crushing plant, featuring a "Non-Clog" hammermill, has been designed by the Dixie Machinery Company of St. Louis. This plant (pictured above), may be adjusted to produce a wide combination of sizes ranging from 85 per cent. rock to 100 per cent. agricultural limestone; it is said to handle wet, sticky clay without clogging.

Quarry-run rock is reduced to minus 1-inch or agricultural limestone in one operation. The plant consists of a 40-inch by 10-foot apron feeder, a 4- by 8-foot two-deck vibrating screen, 36-inch belt conveyor, a Dixie 3640 Non-Clog hammermill, and a Caterpillar D17000 engine. This equipment is mounted on a trailer of welded I-beam construction having 24 pneumatic tires. The front end is mounted on a pivoted framework with coil springs. The electrical push-button controls are hooked up so that the feeder and screen stop automatically when the crusher stops; and they cannot start unless the crusher is running.

● Self-Propelled Plant

The new self-propelled dual crushing plant recently introduced by the Lippman Engineering Works of Milwaukee is a Diesel-powered unit with a 4-wheel tandem drive, mounted on 10 pneumatic-tired wheels. One motor propels and

Control Your Product

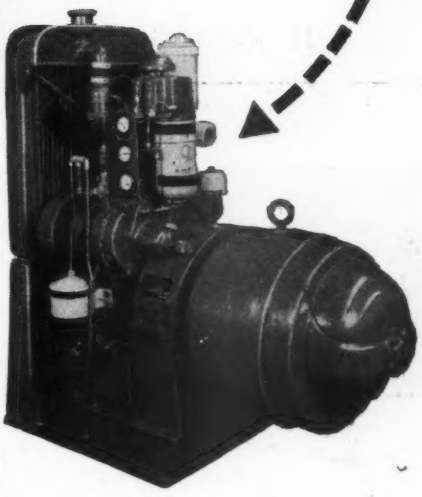
with the

GILSON MECHANICAL TESTING SCREEN

Prepare for post war competition with this modern testing equipment. Operation is smooth and quiet. Separates accurately up to one cubic foot of concrete aggregate in five minutes or less. An attachment is available for vibrating standard sand sieves. Write for complete information.

THE GILSON SCREEN CO.
P. O. BOX 186 MERCER, PA.

Nothing Extra to Buy



A Sheppard Generating Set is ready to produce power when it leaves the factory. All accessories are included as standard equipment . . . there's nothing extra to buy.

Write for new 12 page booklet showing standard equipment and other features of Sheppard Diesel Engines and Generating Sets.

R. H. SHEPPARD COMPANY, INC.
13 Middle St., Hanover, Pa.

DIESEL'S THE POWER- Sheppard's THE DIESEL!

IT COSTS NO MORE TO USE THE BEST

REPLACE WITH
"Indian Brand"

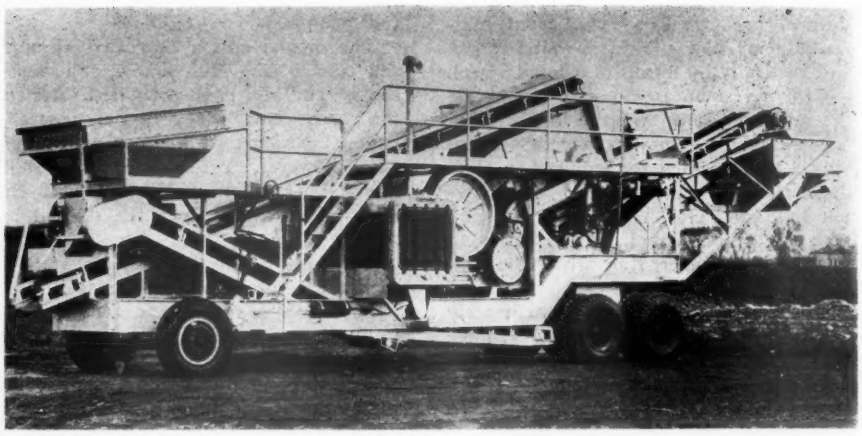
Shovel Dippers
Dipper Teeth
Shovel Treads

Crusher Jaw Plates
Mantles—Concaves
Bowl Liners
Roll Shells

Pulverizer Hammers
Grate Bars—Breaker Plates

Ball Mill Liners
Screen Plates

The Frog, Switch & Mfg. Co. CARLISLE, PA.
ESTABLISHED 1881



Tandem drive, dual crushing plant.

operates the entire plant, which has a traveling speed of 30 miles per hour in high—¾ mile per hour in low—and one reverse speed. The Lippman plant is 10 feet wide and 14 feet high.

The feed hopper is 6 feet by 7 feet; the adjustable eccentric plant feeder, 24 inches by 40 inches; the feed conveyor, 24 inches by 32 inches; and the roller-bearing jaw crusher, 12 inches by 36 inches. The two-and-a-half deck vibrating screen is 4 feet by 9 feet. A reversible reject conveyor for fines measures 18 inches by 9 feet, 6 inches. Other specifications are as follows: roller-bearing crushing rolls, 40 by 20 inches; return conveyor, 20 inches by 24 feet; delivery conveyor, 30 inches by 20 feet; discharge hopper, 1½ yards. The unit also includes a hopper below the screen, with sand ejector.

Oil Filter

W.G.B. lube and fuel oil "Clarofier" models, J, JF, C, T, TF, S, SSS and DDS are known to fleet operators as products of the W.G.B. Oil Clarifier, Inc., of Kingston, N. Y. The latest addition to the W.G.B. line is the CT Model Clarofier, 24 inches high and 6½ inches in diameter, with a ¾-inch inlet at the side and an outlet of the same size at the bottom. Special features cited by the company are rugged construction, efficiency, ease and economy of operation.

The center tube, the point of oil collection, it fitted with a relief valve at

HOW 1 TRUCK CAN DO THE WORK OF 5 FOR YOU . . .

. . . with a Brooks LOAD LUGGER

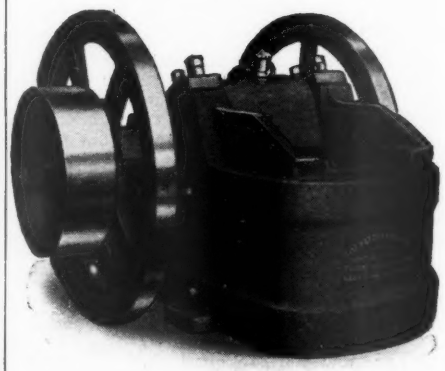
● Wherever materials accumulate periodically or hand labor is employed for loading, the Brooks Load Lugger system has proved itself as the most economical method for loading, hauling and dumping. One Load Lugger on *one* truck, working with 5 to 10 detachable buckets placed at the various points of loading, can be kept busy continuously — hoisting, hauling, dumping and relocating empty bucket and picking up the next full one. With the open-end type bucket, lifting of heavy rocks can be eliminated because they can be rolled into it. Adaptable to scores of other operations. *Write for catalogue today.*

BUSY AS AN OCTOPUS!

Brooks EQUIPMENT AND MFG. CO.
DISTRIBUTORS IN ALL PRINCIPAL CITIES
201 DAVENPORT ROAD, KNOXVILLE 8, TENNESSEE

FARREL BACON
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.



FARREL-BACON
ANSONIA, CONNECTICUT

A HOOK *that* CAN'T LOSE ITS LOAD

The newly-designed latch (with stainless steel spring) gives Laughlin's unique Safety Hook a 25%-40% wider throat opening.

Don't chance accidents up above. Laughlin's Safety Hook keeps loads under control even if jolted in mid-air.

They are made of drop-forged steel, heat-treated. They're rugged. Get the details on these hooks with the improved type of latch.

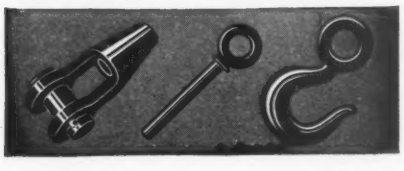
OTHER LAUGHLIN HOOKS

Laughlin offers the most complete line of hooks, including grab hooks, hoist hooks, cargo hooks and other types, all heat-treated, drop-forged and weldless.

Distributed through mill, mine and oil field supply houses. For catalog, write Dept. 3, The Thomas Laughlin Company, Portland 6, Me.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



the top for pressure control. The oil entering the side angle inlet swirls around the filtering element, washing the accumulated sludge from the surface of the element down to the sump, where it is removed through the drain fitting.

When used for lube oil, the governing orifice is placed on the inlet and C.T.L. 108 lube oil cartridges (324-cu.-inch volume) are used. For fuel and cutting oils, the governing orifice is removed to insure a free flow, and C.T.F. 108 fuel oil cartridges (274-cu.-inch volume) are employed.

The C.T.L. cartridge is recommended by the manufacturer for removing stonedust from oil used in crusher lubrication. The C.T.F. is especially featured for the fuel lines of diesel engines and oil burners. In engines the purifying action of the Clarofier is said to prevent clogging of small jets; and in oil burners it performs a similar service in keeping nozzles clean. When used in cutting oils, the C.T.F. reportedly removes metallic particles, thus reducing the occurrence of scratched surfaces.

Trade Literature

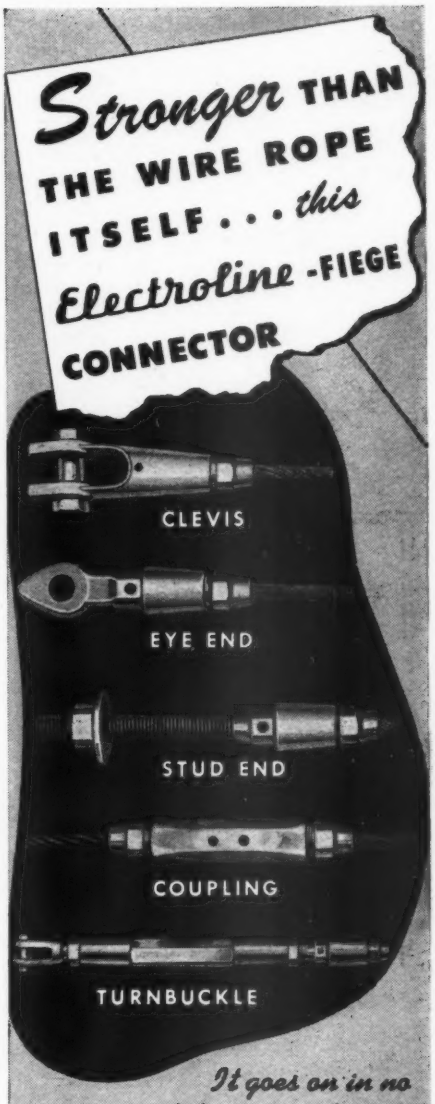
The pieces of literature listed below can be obtained direct from the manufacturers named, or requests can be addressed to Pit and Quarry's "Service to Readers" Department.

STEEL SHAFTS. BULLETIN WG-545. 16 pages. Useful data for determining stresses, torques, bending moments and deflections in round, square, hollow, keyway and stepped steel shafts. Includes tables, charts, graphs and other illustrations. Price, 50 cents. DeLaval Steam Turbine Co., Worm Gear Division, Trenton, N. J.

ONE-MAN AERO CRANE. 16 pages. Catalog 73. Orton Crane & Shovel Co., Chicago.

Correction

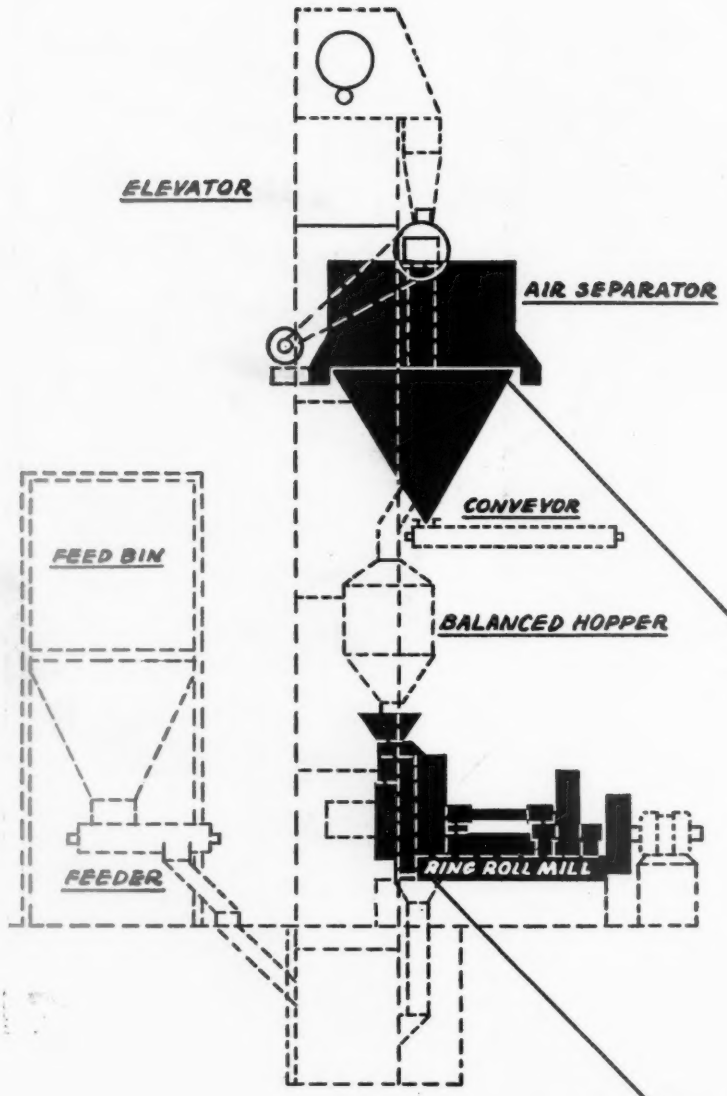
The Gai-Tronics Corporation was erroneously located (in the preceding issue) in New York. The firm's headquarters are in Washington, D. C.



It goes on in no time — and hangs on for all time: this simple, husky device. Simply put the cable end through the sleeve, spread the strands, insert and drive in the plug, apply the socket and set in tight. Through the ingenious inspection hole you can see by the twisted strands that the joint is perfect.

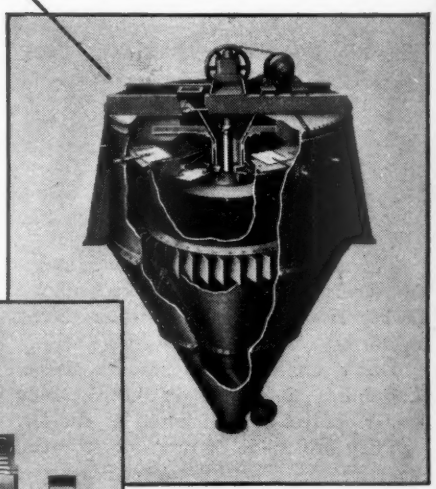
These better connectors dampen vibration, prolong wire rope life. These advantages, plus low cost installation and life-time service, have made them the standby in the shipbuilding and construction industries, and wherever wire rope and cables are used. Available through your mill supply distributor.

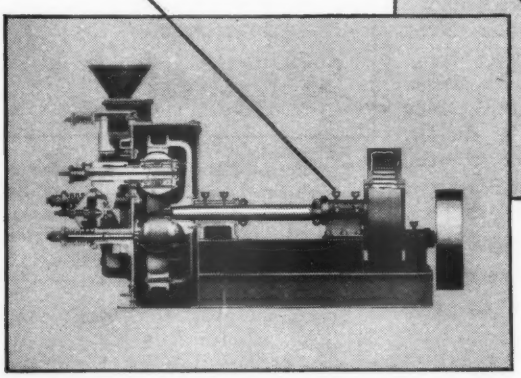
MANUFACTURED SOLELY BY
Electroline Company
4121 SOUTH LA SALLE STREET
CHICAGO 9, ILLINOIS



The RIGHT Combination

For Top Tonnage at Reduced Costs





WHIRLWIND AIR SEPARATOR
Capacities ¼ to 50 tons per hour.
Range 40 to 325 mesh or finer.

RING ROLL MILL
Capacities 12 to 18 tons per hour.
Range 10 to 200 mesh.

STURTEVANT

Air Separators and Ring Roll Mills

Here's a combination for finer ground limestone, lime and hydrate with maximum efficiency . . . Sturtevant air separators and Ring Roll Mills in closed circuit.

The ring roll mill crushes either hard or soft materials for medium or fine reductions (10 to 200 mesh). The air separator efficiently carries off all classified material in any desired range from 40 to 325 mesh or finer. The combination increases output up to 300% . . . saves in power cost up to 50%.

You should consider the tonnage and controlled product benefits of Sturtevant Equipment. Write for full information and catalogs. Sturtevant Engineers are available for consultation on your grinding and separating problems. Their services are obtainable without obligation.

STURTEVANT
MILL COMPANY
42 Harrison Square, Boston 22, Mass.

Designers and Manufacturers of

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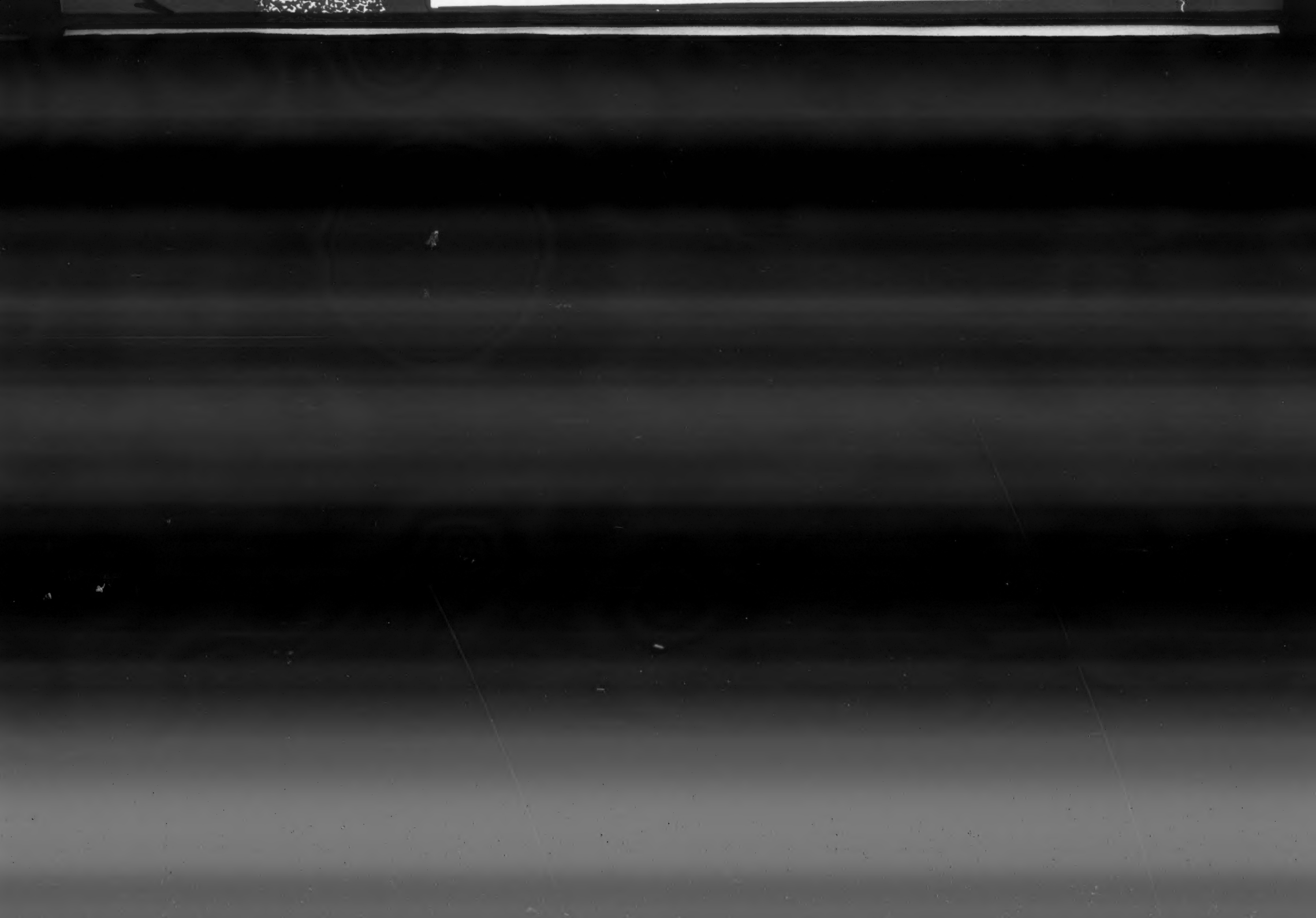

July, 1946

The CONCRETE MANUFACTURER

A Special Section of...

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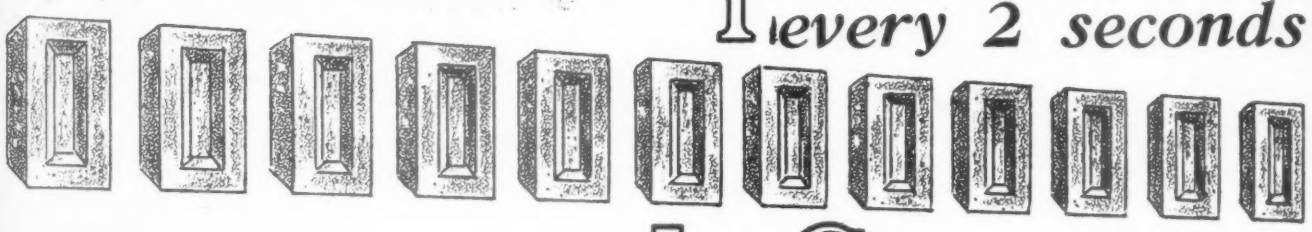

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Either the J&C Model NC Press, or the big Model A, with *double* the capacity, provide maximum service life, operating economy, and investment return.

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HIGH PRESSURE STEAM CURING

This curing method produces high early strength concrete without using costly additives.

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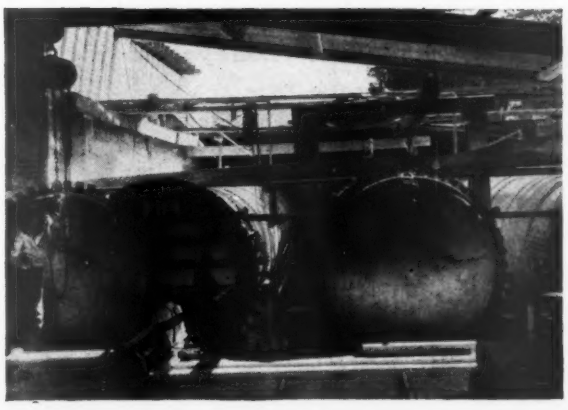

Write for Bulletin

Administration Building, McLaughlin Field, Hot Springs, Arkansas. Architects, Erhart, Eichenbaum and Rauch, Little Rock; contractors, Peterson & McFadyen, Little Rock; ready-mixed concrete furnished by C. J. Horner Co., Hot Springs.

FOR THIS HEART OF AN AIRPORT

Better Concrete . . . At No Extra Cost

with Duraplastic Air-Entraining Cement

INTO THIS modern structure went 1,000 cubic yards of ready-mixed concrete made with Atlas Duraplastic. The characteristics of this air-entraining portland cement were reported as follows:

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U. S. STEEL RADIO SHOW—*Sunday Evenings—Consult local newspaper for time and station*

A UNIVERSAL ATLAS PRODUCT

The CONCRETE MANUFACTURER

JULY, 1946

Vol. 10 No. 1

A MAGAZINE DEVOTED TO PRODUCTION OF CONCRETE PRODUCTS AND READY - MIXED CONCRETE

ECA

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J. A. CONVERSE

N.C.M.A. Names Copeland Engineering Director, Sets 1947 Meeting Date

At a meeting of the executive committee of the National Concrete Masonry Association in Detroit it was decided to appoint R. E. Copeland as full-time director of engineering. Mr. Copeland began his new duties on May 15. For the last 17 years he has served on the staff of the Chicago headquarters office of the Portland Cement Association. Here he began his work in the cement products bureau. Recently he has been in charge of concrete products research in the development department of the P.C.A.

R. E. Copeland

The committee members also confirmed an earlier decision to stage the Concrete Industries Exposition in conjunction with the 1947 Association meeting. Final arrangements were approved to hold the annual meeting during the week of February 17, 1947, at the Hotel Sherman in Chicago.

F.H.A. Grants Permits for 544,041 Homes in 4 Months

Applications for materials priorities involving 544,041 new dwelling units were approved by field offices of the Federal Housing Administration, acting for the Civilian Production Administration, between January 15 and May 17, 1946. The total consists of applications to construct 483,289 new homes, of which 52 per cent. will be for sale at less than $7,500 or for rent below $60 a month.

An additional 60,752 new dwelling units are covered by priorities application to remodel existing structures for the creation of additional units for veterans. The F.H.A. also approved 29,467 applications for other repair and alteration jobs, many of which covered authorization to construct without priorities assistance, under the Veterans Emergency Housing Program.

Grove Block Plant Closed Because of O.P.A. Ceiling

According to statements made by the management of the M. J. Grove Lime Co. of Frederick, Md., the firm has closed its concrete- and cinder-block plant in that city because of O.P.A. ceiling prices.

Officials said that they had taken the step reluctantly, realizing that the block production in the immediate area would be cut by approximately 1,000,000 units per year. The company was forced to discontinue block production, they said, after having sold its products at a loss for over two years.

Concrete Masonry Makers Serve as Advisory Body

The Office of Price Administration, Region VI (North and South Dakota, Nebraska, Minnesota, Wisconsin, Iowa, Illinois and Lake County, Indiana), recently invited a group of Midwestern manufacturers to act as an industry advisory committee in assisting to formulate new orders for the pricing of concrete masonry units. These men, members of the National Concrete Masonry Association, worked out a set of recommendations which, if accepted by the O.P.A., would give producers in this region definite dollars-and-cents ceiling prices for all types of units.

Coming Events

July 17-20, 1946—Spokane. Summer convention, American Society of Civil Engineers, Davenport Hotel.

October 7, 1946—Chicago. 34th National Safety Congress and exposition, Stevens Hotel.

October 16-19, 1946—Kansas City, Mo. Fall meeting, American Society of Civil Engineers.

March 5-7, 1947—Los Angeles. 17th annual convention, National Ready Mixed Concrete Association, Biltmore Hotel.

James S. Sigler Elected Vice-President, Secretary Of Roy Darden Industries

James S. Sigler

James S. Sigler has been elected vice-president and secretary of Roy Darden Industries, Southwestern Division, Inc., with headquarters at Dallas, Texas. In the mechanical, electrical and structural engineering fields, Mr. Sigler has been active in the direction of government building work in Mississippi. He has executed many projects involving special types of construction, using concrete blocks and light-weight monolithic concrete walls.

As vice-president and secretary of the newly-formed Roy Darden Industries, Southwestern Division, Inc., a subsidiary of Roy Darden Industries, Inc., of Atlanta, Ga., he will have charge of field and installation operations in the United States and abroad.

St. Louis Firm Receives First Air-Borne Machine

The O. B. Avery Co. of St. Louis recently received its first piece of machinery, a 1,400-pound Kissam-Blatt Controlled oscillator block machine, by air express. The historic first air shipment of concrete-block-plant equipment was loaded at Pinellas Master Airport, St. Petersburg, Fla., under the supervision of the Frank I. Blatt Sales Co., Inc., of Rattlesnake, Fla., which had launched its "Flying Sales & Service" only a short time earlier.

The delivery of the machine, manufactured by the Hendry Corp. of Rattlesnake, was made in six hours by United Air Lines.

Freight Increases Passed To Concrete Industry

Of vital importance to the concrete products industry is the petition of the railroads to the Interstate Commerce Commission for a freight rate increase of 25 per cent. Specifically, the railroads are asking for an increase of 20 cents per net ton in rates for sand and gravel, crushed stone and furnace slag. Rates for Portland cement would be raised by 50 cents a ton (about 10 cents a barrel).

All of these increases must be carried by the manufacturer of concrete masonry units unless he can prove that a loss in normal profits will follow from the higher costs. If he can meet Office of Price Administration provisions for hardship cases, action will be taken by that agency to adjust ceiling prices.

Manning Succeeds Willson As C.P.A. Section Head

John T. Manning was recently named head of the section of the Civilian Production Administration dealing with the concrete masonry industry, replacing C. A. Willson, who has assumed his new duties in the National Housing Administration.

The C.P.A. also announced the revision of PR 28 on April 2, which greatly curtails the granting of CC ratings for equipment to set up new plants, but favors older plants needing replacements. The C.P.A. is lending full support to increased production in established plants.

Left to right: Ted Kissam, Kissam Building Supply Co., Orlando, Fla.; Frank Blatt, Blatt Sales Co., Inc.; Allen Kissam, designer and inventor of the block machine; Capt. F. M. Hendry, Hendry Corporation, Rattlesnake, Fla.

U. S. Army Engineers' Concrete Laboratory To Be Deactivated

The Central Concrete Laboratory of the North Atlantic Division, Corps of Engineers, U. S. Army at Mount Vernon, N. Y., is to be deactivated during the month of June, 1946. The purpose of the deactivation is to permit the transfer of the key personnel and equipment to Clinton, Miss., where a new labortory is to be created as a division of the U. S. Waterways Experiment Station, Vicksburg, Miss.

The new laboratory will be known as the Concrete Research Division of the U. S. Waterways Experiment Station and will be headed by Charles E. Wuerpel, who is now engineer in charge of the Central Concrete Laboratory. All research work on cement, concrete and materials related to concrete construction which are required by the U. S. Engineer Department will be performed at Clinton. A further purpose of the laboratory will be to provide adequate facilities for the investigation of problems related to concrete to be placed in specific structures by the U. S. Engineer Department throughout the United States.

The U. S. Waterways Experiment Station now consists of a major hydraulics laboratory and a major soils laboratory, as well as a research center whose purpose it is to coördinate all research activities of the U. S. Engineer Department. It is anticipated that the new Concrete Research Division will be ready for operations in September.

New Materials Developed To Speed Housing Program

A promising array of new building materials being developed by private industry is expected to result in the construction of more home under the Veterans Emergency Housing Program than would otherwise be possible, according to a statement made by Wilson W. Wyatt, National Housing Expediter and Administrator of the National Housing Agency.

Materials surveyed which are germane to the concrete industries are made either (a) from non-scarce raw materials or (b) from a combination of scarce with non-scarce raw materials. The products fall into two general classes: (1) panels or entire dwelling units made from light-weight concrete, and (2) structural panels made from plastics, aluminum and other substitutes for lumber and plywood.

The light-weight concrete products vary as to ingredients and fabrication. Many of them utilize waste materials such as slag, wood chips, waste paper, tree bark and cotton hulls mixed with cement. These aggregates have several advantages: they lighten the products, they make it possible to mold large panels, and they have good insulating properties.

The products vary from standard-size blocks to precast house sections. The latter are used in constructing floors, walls, partitions and even roofs.

N.R.M.C. Assn. to Sponsor 1946-47 Safety Contest—Prizes by Pit and Quarry

Plans for the launching of the safety contest to be sponsored by the National Ready Mixed Concrete Association were outlined in an announcement made recently by Executive Secretary Vincent P. Ahearn. The competition, which will run from July 1, 1946, to July 1, 1947, will stress the development of safe practices for the concrete industry in its use of highways and streets, as well as the safety of employees in their regular work. Trophies will be awarded to the winning companies by PIT AND QUARRY.

Contesting companies will be divided into two classes, those producing less than 25,000 cubic yards of concrete annually, and those with production exceeding this figure. The contest will be scored on the following basis: (1) accident-frequency rating of personnel at the plant—15 points; (2) accident-frequency rating of personnel engaged in delivery—35 points; (3) public liability rating—20 points; (4) property damage rating—30 points.

The scores will be rated as follows: (a) *Disabling injuries to personnel of plant.* This part of the contest will be the same as a standard industrial-plant safety contest. Reports of numbers of employees, number of man-hours of exposure and number of disabling injuries will be sent to the association's headquarters.

(b) *Disabling injuries to personnel of delivery equipment, drivers and helpers.* This will be kept on a standard frequency-rate basis similar to Section 1 of contest.

(c) *Public liability (injury to persons other than employees of reporting member).* This score will be computed on the basis of the number of persons injured per 10,000 cubic yards of concrete delivered.

(d) *Property damage (damage to mechanical equipment and public property).* The totals of this section will be computed on the basis of the number of accidents to property (owned by either the member or the public) per 1,000 cubic yards of concrete delivered.

Manufacturers Allowed to Apply for Scarce Items

The Civilian Production Administration has made public the revised list of critically scarce products, the producers of which may be granted urgency certificates to purchase surplus equipment from the War Assets Administration.

These certificates, described in Direction 16 to Priorities Regulation 13, give the holders precedence over any other class of buyers on the W. A. A. stocks of surplus equipment, and are granted only to producers of the items listed in Schedule 1 of PR-28, who can demonstrate that the equipment is urgently needed to sustain or to increase their production.

The following points are emphasized by the C.P.A.:

1. Urgency certificates are issued only for urgently needed equipment and only to manufacturers of the critically scarce products listed in Schedule 1 of PR-28.
2. Urgency certificates are good for only 60 days after issuance and are honored by W.A.A. sales offices in the order of presentation.
3. All applications should be made on C.P.A. Form 4425, available at the C.P.A. office, Washington 25, D. C., and in the 71 district construction offices. When completed, the forms must be filed in the C.P.A. Washington office.

Listed on the schedule of critical products are: asbestos-cement shingles and flat sheets; asbestos-cement siding and flat sheet specialized machinery; gypsum board and lath; gypsum board and lath specialized machinery; concrete building products; and concrete building products machinery and equipment.

Loans for All Home Needs Insurable by Housing Act

With the signing of the Veterans Emergency Housing Act of 1946 by President Truman, the Federal Housing Administration now can insure loans covering all kinds of housing requirements from small owner-occupied houses to large-scale multi-family structures for rental. During the 12 years the F.H.A. has been in operation, insurance of loans and mortgages has aggregated more than $9,000,000,000. Nearly 1,500,000 new homes have been financed in this way, and 5,500,000 homes have been improved or modernized.

Vast Expansion Predicted For Concrete Industry Despite Severe Handicaps

Due to the shortage of lumber, brick, and clay tile, the demand for concrete block has been steadily mounting. The output in 1945 was estimated at approximately the equivalent of 500,000,000 standard 8- by 8- by 16-inch blocks, more than twice the highest annual pre-war figure, according to *Business Week* (June 1, 1946). Goals set up by the Federal Housing Administration call for 800,000,000 blocks in 1946 and more than 1,000,000,000 in 1947.

The chief obstacles to increased production, says *Business Week*, are labor shortages, scarcity of repair parts and equipment, including trucks for transportation, and difficulty in obtaining aggregates for lightweight block. Leaders in the industry, however, believe that keeping two or three shifts at work in existing plants will do much to relieve the current shortage. They warn that if too many new block plants are set up, cut-throat competition may cause a serious crisis when other building materials again become plentiful.

Trade lists, it is said, show about 4,000 concrete block plants, of which only 900 are producing more than 100,000 blocks annually. A 1942 survey of 1,700 plants by the National Concrete Masonry Association indicated that 35 per cent. accounted for 93 per cent. of the total volume.

Lightweight units, made of cement and sand, plus coarse aggregate such as cinders, slag or shale are said to account for 50 per cent. of present block production.

Above is an illustration of interlocking concrete slab tilt-up rapid construction employed by Royalith Builders of Tacoma, Wash., and the Concrete Construction Company, of Seaside, Ore. This type of construction was used to build in eight hours a one-story house containing 3 bedrooms, 2 baths, a living room, a kitchen, a dinette, a utiilty room, and an attached garage. Composition paper tubes were inserted in the concrete slabs to create dead air space.

New Products Firm Builds Model Plant At East Point, Georgia

By WILLIAM M. AVERY

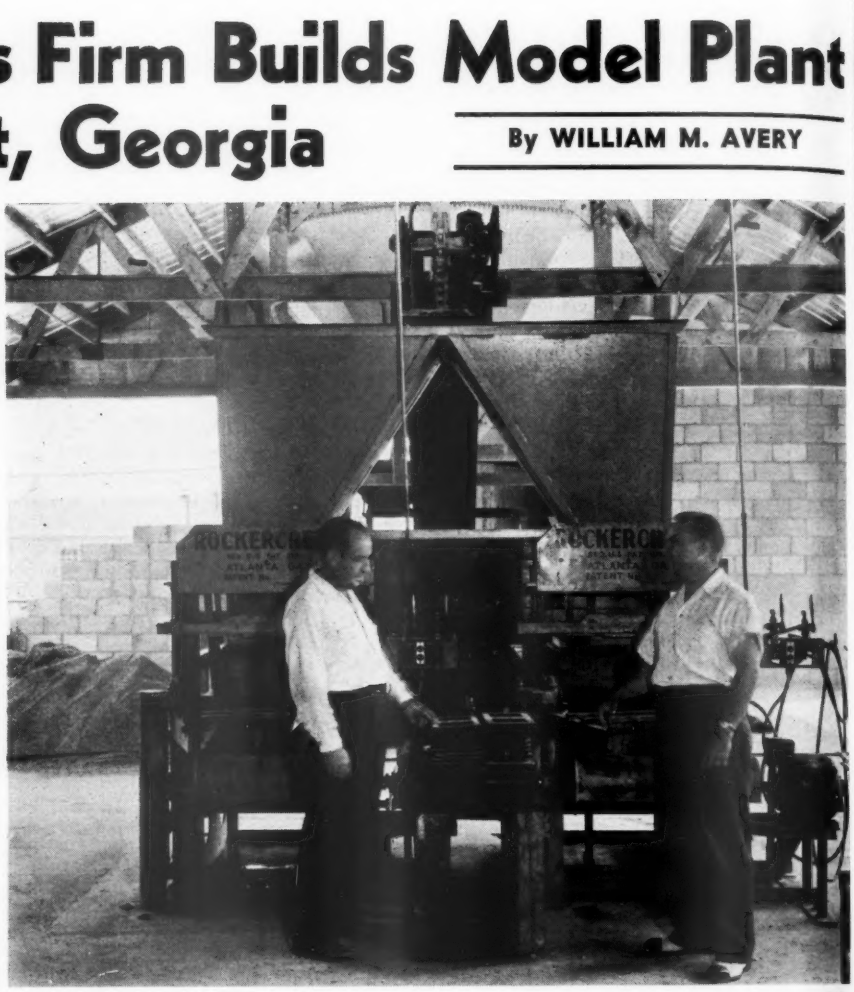
another ON THE SPOT report

AN important installation of the Darden Rockercrete block machine has been made at the Best Concrete Products Company, a new concern located at East Point, Georgia, a highly industrialized suburb of Atlanta. The Rockercrete, a relative newcomer in the booming concrete products field, incorporates several novel departures from conventional block-machine design, and its performance will be watched with keen interest by an industry which has always welcomed new ideas.

The Best Concrete Products Company is owned and operated jointly by Ralph L. Wiggins and C. F. Johnson, the partnership a culmination of a friendship of many years. Neither man has had any previous experience in the concrete-block industry, but this liability has been cancelled, and in some degree converted into at least a minor asset, by their consequent willingness to seek expert counsel in all matters pertaining to the design and layout of the plant. An example of this is the inclusion of steam curing in the plant setup, a provision seldom made in small plants south of the Mason-Dixon Line, although the advantages have been repeatedly demonstrated.

The company uses a locally-produced minus 3/8-inch graded aggregate which is delivered in hopper-bottom cars on the plant siding adjoining the Atlanta and West Point Railroad. A Link-Belt chain-bucket elevator picks up the material in an undertrack hopper and discharges it into a single-compartment, cone-bottom steel tank of 76 tons capacity. With the assurance of a dependable local source of material, no additional stock-piling of aggregate is contemplated. Two carloads of bagged cement can be accommodated in the concrete-masonry storage building adjacent to the plant.

The 28-cubic-foot batch mixer, the 10-inch-wide drag-flight conveyor which feeds concrete from the mixer to the block machines, and the two Rockercrete machines themselves, were all furnished by Roy Darden Industries, Inc., of Atlanta. A feature of the mixer design is the location of the 20-horsepower drive motor on a cross-frame member above the paddle to achieve the minimum exposure to dirt and moisture. The liner plates are 1 1/8-inch-thick cast iron. The drag-flight conveyor is driven by a 3-horsepower motor



C. F. Johnson (left) and Ralph T. Wiggins, co-owners of the Best Concrete Products Company, before the newly installed block machines.

General view of the Best Concrete Products Company plant at Atlanta, Ga., showing cement storage building at right and curing rooms at left. Tank above plant holds 76 tons of aggregate.

mounted above the head shaft. A tunnel through the hopper below the mixer provides clearance for the return chain without its coming in contact with the mix. The conveyor discharges into a 1½-batch pant-leg steel hopper supported by the two block machines.

One of the features of the block machine is the successful application of compressed air to the forward and return movements of the sliding hopper and to the stripping operation. Double-acting cylinders are used to effect the elimination of hand labor in the molding and stripping of the blocks. Operation of the cylinders is controlled by 4-way valves conveniently mounted on a bracket at the right of the machines. The air is supplied by two Westinghouse Airbrake 20-cubic-foot-per-minute compressors, one for each block machine. By means of a blow-off line located at each machine, compressed air can also be used for cleaning up at the end of a shift.

The Rockercrete derives its name from the use of the rocker-arm principle both in the transmission of vibration and in the stripping operation. The vibrating mechanism, powered by a General Electric induction motor, has an adjustable amplitude ranging between 25 and 35 thousandths of an inch. Vibration starts automatically with the forward movement of the hopper but is cut off manually by the operator after about 3 seconds, within which time the leveling head drops the required half inch into the mold box. In this way the height of the blocks can be controlled within a 1/32-inch tolerance. The leveling head is claimed to aid materially in the production of a smooth top surface. Any material adhering to the head is cleaned off automatically after each cycle of operation by a belt wiper. The leveling head is raised about half an inch above the block before the unit is stripped from the mold, and this clearance is maintained as the block moves upward.

Gasoline-powered lift truck used for handling cured block. Note welded-pipe construction of racks.

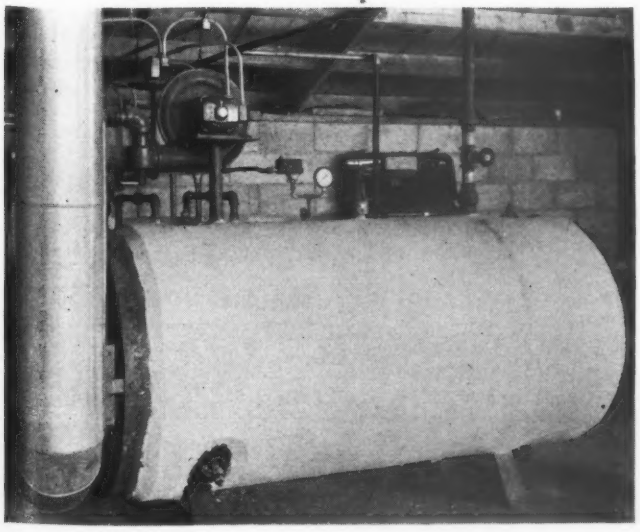
The machine makes a 2-core modular block measuring 7⅝ by 7⅝ by 15⅝ inches, and it is capable of performing 3 to 6 cycles per minute, depending upon the skill and experience of the operator. Finished blocks are swung into position for loading into racks by means of a pivoted off-bearer mounted at the left of each machine. One 8-inch or two 4-inch units can be made in each cycle of operation. A tapered partition located in the center of the mold box produces a weak plane in the finished block, enabling the mason to produce half-blocks on the job with a single hammer blow. This provision has no effect on the strength of the full-length unit.

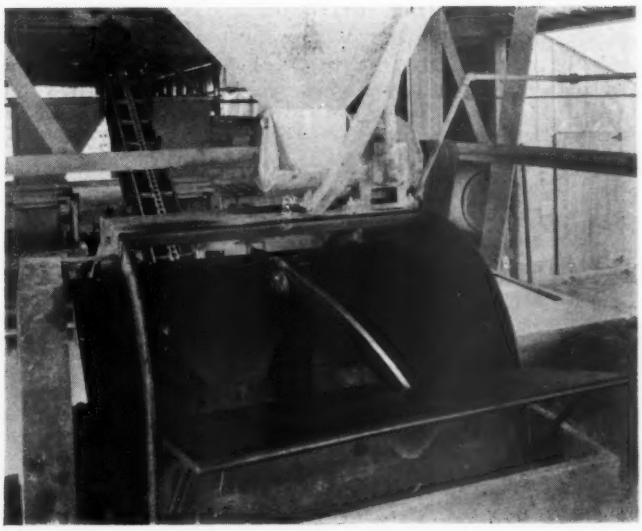
At this writing, the Best Concrete Products Company's plant has not been in production long enough for significant average production figures to have accumulated. The Darden machine is rated at 1,500 to 1,800 units per 8-hour day, but other users have consistently reported outputs ranging between 1,800 and 2,200.

The plant uses a 36-block rack made of welded steel pipe. Racks

(*Continued on page* 186)

Left: A chain-bucket elevator feeds aggregate from under-track hopper to storage tank. Right: Compressed air for the block machines is furnished by 20-c.f.m. compressors. Below, left: The 30-horsepower boiler plant is gas-fired and completely automatic. Below, right: The 28-foot batch mixer has 1⅛-inch cast-iron liners. Note the top mounting of the motor.





Southern Plant Profits by Detailed Cost Accounting, Selective Production

another ON THE SPOT report

THE starting of a new business enterprise in direct competition with some 40 established concerns calls for a special brand of fortitude and determination, not common to the rank and file of humanity. We judge this to be true even when the business is making concrete masonry units and the time is at the peak of the most severe building material shortage this nation has ever experienced.

By WILLIAM M. AVERY

When Marion J. King, Jr., organized the King Concrete Products Company in Jacksonville, Florida, early this year, he was fully aware of the 40-odd established competitors already supplying the demand, and of the hazards inevitably entailed in launching a new business enterprise in a market that would quickly become glutted when the peak of war-deferred construction had passed. He reasoned, however, that a considerable share of the competition was definitely second rate and incapable of surviving long in a buyers' market. Accordingly, Mr. King approached the concrete block business with the firm resolve to make only the very best products that ingenuity could devise, to the end that when buyers might again exercise judgment their first preference would be for King blocks.

A one-bag mixer with inclined belt conveyor below.

An 18-inch by 40-foot portable belt conveyor is used to load materials from the stockpiles to the bin.

The King plant started operations early in March of this year with two George Super V, 2-unit concrete block machines, and production since that time has averaged 3,000 units per 8-hour day, or 15,000 per 5½-day week. Although these machines are equipped with accessories for making open- or square-end blocks, jamb blocks, lintels, half blocks and other specials, the output of the King plant has been largely concentrated on 8- by 8- by 16-inch units because of the low ceiling prices allowed on other sizes. Similarly, all sales have been f.o.b. plant because the price increment allowed for delivery falls considerably short of the actual cost.

One of the most interesting and significant things about the King Concrete Products Company is that a complete system of cost accounting is maintained, in accordance with the owner's conviction that the only economical way to manufacture a superior product is to know exactly how much each step in the process costs. It seems probable that the majority of block plant operators today can arrive at some sort of

General view of the King Concrete Products Company's plant, Jacksonville, Fla., showing aggregate storage area and bin at left and block storage at right. The roofed area comprises 3,000 square feet.

unit cost in connection with their operations, but we doubt if more than a handful are able to break down over-all cost per unit into its component parts.

Since the first day the King plant operated, accurate records have been kept of the cost of cement, sand, gravel, labor and supervision, and overhead, and these items have been tabulated with respect to 8- by 8- by 16's, 8- by 8- by 8's, 4- by 8- by 16's and partition tile. These data quickly established that only in the case of 8- by 8- by 16-inch units was a fair profit possible under existing ceiling prices, and this knowledge prompted the decision to restrict the production of specials as much as possible.

The costs shown in Table I cover only the first six weeks of production, which explains the absence of an item for maintenance. In addition, certains costs, such as taxes, had not yet been determined. The company pays $2.83 per barrel for cement, f.o.b. Jacksonville, and unloads it at a cost of $0.1076 per barrel. Sand at $1.60 per ton costs $0.2727 per ton to unload, with the same unloading cost applying to gravel purchased at $2.90 per ton.

All shipments from the King plant go out with an order form stamped with the certification of the Pittsburgh Testing Laboratory, in effect assuring the buyer that far from having anything to hide, the company takes definite pride in the excellence of its product. A typical test covering ten 8- by 8- by 16-inch 2-cell units at the age of 15 days shows crushing strengths ranging from 1,042 to 1,212 pounds per square inch. These units have a minimum wall thickness of 1¼ inches and a sectional area of 122 square inches.

Mr. King has developed a technique of his own for controlling absorption, and has already obtained remarkably good results, as indicated by the data in Table II furnished by the Pittsburgh Testing Laboratory. The block produced in his plant easily pass the A.S.T.M. 40 per cent. limitation at the age of 15 days, and Mr. King feels confident that with further refinements of the technique employed even more remarkable results may be obtained. It is unfortunate, but understandable, that he refuses to disclose any details concerning this development.

The two 2-unit block machines are arranged back to back and are fed by a belt conveyor.

Currently the King plant is using washed lake sand from Interlachen, Florida, and granite chips from Palmetto Quarries, Columbia, South Carolina. The materials are shipped in by railway and unloaded with a Farquhar overtrack conveyor. The 2-compartment bin, holding 34 cubic yards of sand and 20 cubic yards of granite chips, is loaded from stockpiles with an 18-inch by 40-foot Farquhar portable belt conveyor. Starting with a full bin, the plant can operate for half a day without reloading. It takes about an hour and a half to fill both compartments of the bin. Eleven carloads of aggregate can be stockpiled on the yard adjacent to the plant.

ORDER FORM

KING CONCRETE PRODUCTS

2035 HARPER STREET
TELEPHONE 5-7828
JACKSONVILLE 4, FLORIDA

SOLD TO _____

DELIVER TO _____

DELIVERY DATE _____

QUANTITY	CONCRETE BUILDING TILE	UNIT PRICE	AMOUNT
	8x8x16		
	8x8x8		
	4x8x16		
	4x8x8		
	PARTITION TILE		
	4x8x16		
	4x8x8		
	4x4x16		
	4x4x8		
	Cement (Portland)		
	Cement (High Early)		
	Cement (Masonry)		
	SAND		
	GRAVEL		

THIS PRODUCT CERTIFIED BY PITTSBURGH TESTING LABORATORY

CONTRACT NO. 11

Order form used by the company, showing certification stamp of the Pittsburgh Testing Laboratory.

Bagged cement is also shipped in by railway and transferred to the storage shed by means of gravity conveyors. Three carloads can be accommodated.

At the present time the plant controls batching by the volume method, but it is the intention to shift to weigh batching as soon as the necessary equipment can be obtained. As an additional control measure—one too often neglected by block plant operators—a moisture determination test is made on the sand each morning, and the water addition adjusted in accordance with the finding.

The aggregates flow from the bin through manually-operated gates into a graduated hopper above a

TABLE I—BREAKDOWN OF PRODUCTION COSTS (CENTS PER UNIT) FOR VARIOUS SIZES OF CONCRETE BLOCK

Size of Unit	8x8x16	4x8x16	8x8x8	Partition
Weekly Production	11,000	12,100	16,500	.....
Cement (unloaded)	3.672	1.836	1.836	2.203
Sand (unloaded)	2.337	1.168	1.168	1.402
Gravel (unloaded)	2.377	1.188	1.188	1.426
Labor and Supervision	5.000	4.540	3.340	3.340
Overhead	2.530	2.298	1.688	1.688
Total	15.916	11.030	9.220	10.059

TABLE II—RESULTS OF ABSORPTION TEST BY PITTSBURGH TESTING LABORAORY

Percentage Absorption	Absorption, lbs./cu. ft.	Percentage Moisture Compared to Total Absorption
5.87	7.78	34.0
5.68	7.60	36.0
5.70	7.30	32.5
4.30	5.91	31.5
4.78	7.75	31.6

Left: Incoming aggregates are unloaded with a portable overtrack conveyor.

Center: Three jack-lift trucks are used for handling racks both in the building and in the storage yard.

Right: A 200-ampere arc welder is used to make welded racks and pallets.

one-bag mixer. An inclined belt conveyor feeds material from the mixer to a pant-leg steel hopper above the two block machines, which are set up back to back. The mixer, the conveyor and the block machines were all furnished by the F. C. George Machine Company.

The blocks are loaded onto 36-unit welded steel racks and stored under roof for 24 hours. With 5,000 square feet of area under roof, the plant could store 48 hours production if necessary. After their removal to the yard the blocks are kept damp for 5 days and then allowed to air dry for an additional ten days. The company refuses to ship blocks until they have aged at least 15 days.

Three Barrett - Cravens jack - lift trucks are used at present for handling racks both in the building and on the yard runways, but eventually yard transport will be handled with power equipment. Whereas at present it takes about 8 hours to stack 3,000 blocks on the yard, Mr. King estimates that a power truck would cut the time to 6 hours. With the existing paved runways, about 60,000 8- by 8- by 16-inch equivalents can be stored. Additional runways would make it possible to accommodate at least 160,000.

The company makes all its own racks and pallets, and can show substantial savings on these items even in the relatively short time the plant has been in operation. Racks are built at a total cost of about $12.00 and pallets average around 32 cents each. The welding work is done with a P & H 200-amp. arc welder.

In addition to a plant manager, 11 men are employed in the operations of the King Concrete Products Company. The forthright steps taken by this young concern to assure a future market for its products are difficult to appraise in a period when anything can be sold if it ever-so-faintly resembles concrete block and will hang together long enough to be loaded onto a truck. But from our vantage point, Mr. King's premises seem thoroughly sound, and we think it entirely probable that by his pursuit of quality production in a period when only quantity seems important, he can insure a market for his products when competitive selling again becomes fashionable.

Model Plant

(*from page* 183)

of uncured blocks are handled with two pneumatic-tired jack-lift trucks. Cured blocks are transported from the curing rooms to the storage yard by means of a Truck-Man gasoline-powered lift truck.

The curing rooms have concrete-block side walls and 4-inch poured-concrete roofs. They are 11 feet wide, 16 feet long, and 6 feet high, and have a capacity of 324 blocks, or 9 racks, each. Eight rooms—four on either side of a wide, roofed aisle—are in operation at present, but the plant will soon require two additional rooms in order to have sufficient capacity for two-shift operation. The boiler plant, which furnishes steam for curing, is a fully-automatic, 30-horsepower, gas-fired unit produced by Sellers Engineering Company. Notwithstanding the warm summers which tempt many producers in the South to forego sound curing practice, the owners of this plant contemplate steam curing on a year-around basis.

The owners have wisely provided generous space for their operations. The main building housing the block machines is a 30- by 50-foot timber-trussed structure with concrete-block side walls and Alcoa sheet-aluminum roof, adjoined at one end by an 18- by 36-foot cement-storage building and at the opposite end by the curing rooms. Small alcoves on either side house the air compressors and the boiler plant. The 2½-acre site was selected with a view to expanding operations at some time in the future to include the production of ready-mixed concrete, concrete bricks, joists, lintels, drain tiles, septic tanks and other products.

Florida Block Makers Plan State Association

With Bob Jacobson of Tampa, Fla., acting as chairman, a group of 34 Florida concrete block manufacturers met in Tampa on April 14 to organize a state association. A four-man legislative committee was appointed to draft a constitution and by-laws. (The Tampa branch held its first meeting on March 30, when the proposal for a state-wide organization was made.) A nominating committee also was named.

The following three-point program has been set up: (1) the establishment of better trade practices in the industry; (2) the promotion and stimulation of expansion of the concrete block industry; (3) the establishment of a statewide building code with uniform specifications.

Tampa Perma-Stone Co. Opens New Display Room

The Tampa Perma-Stone Co. of Tampa, Fla., recently opened the first of a number of branches in that city. Other showrooms are to be opened later in St. Petersburg, Miami and other cities in southern Florida.

Demonstrations of the product are currently being given. Perma-stone is composed of fresh-water sand, cement, crushed quartz, mineral colors, hardeners and waterproofers. The mortar is mixed on the site and applied to the side of building in a mold. Company spokesmen say that Perma-stone can be applied to structures of frame, cement block or other materials with equally satisfactory results.

Harold T. Sharp, 45, manager of the Ashlar Concrete Products Co. of Seattle, died in that city on March 29.

Modern Illinois Block Plant Designed To Provide for Expansion

By FLOYD C. LEVERETTE

another ON THE SPOT report

THE demand for concrete blocks for housing in northern Illinois is being partially satisfied by the Arlington Heights Concrete Products Company, of Arlington Heights, Illinois. The present plant was put in operation in July, 1945, although an earlier plant had been supplying the locality for 25 years. The first products were face-down rock-face blocks. Frank Busse and Paul Taege are operating the company as a partnership; Mr. Busse has been in the block business for about 25 years, and Mr. Taege has been associated with him for the last 15 years.

This new plant, which is located on the outskirts of Arlington Heights, receives its aggregates in carload shipments brought in on a Chicago & North Western Railway siding. Bagged Lehigh air-entraining cement is received in box cars and is transferred to the storage space on the second floor of the plant by a belt conveyor which is pivoted on the side of the building. When not in use, the conveyor is placed in a vertical position, parallel with the wall; when it is to be used, a door on the second floor is opened to allow the upper end of the conveyor to come down and into the building as the other end is brought up to the position for unloading the sacks of cement from the cars. This arrangement enables two men to unload a car in 1¼ hours.

General view of the Arlington Heights Concrete Products Company's plant at Arlington Heights, Illinois. Five curing rooms are in foreground.

Aggregates are discharged from the cars into a track hopper which is connected to a bucket elevator by a short belt conveyor. The elevator carries the aggregates up about 75 feet to the Butler 4-compartment bins which have a capacity of approximately 9 carloads. These bins are equipped with steam lines for heating the aggregates during the winter months, thus permitting year-around production.

Proportioning in the Butler batching hopper is controlled by a Butler 3-beam scale. Immediately below the batch hopper is a Besser 50-cubic-foot batch mixer. A water

(*Continued on page* 190)

Below, right: Automatic block machine produces 4,500 units per day. Left: 50-cubic-foot mixer and batching hopper with 3-beam scale in right background.

Compressed Air Plays Vital Role In Efficient Operation Of Cleveland Plant

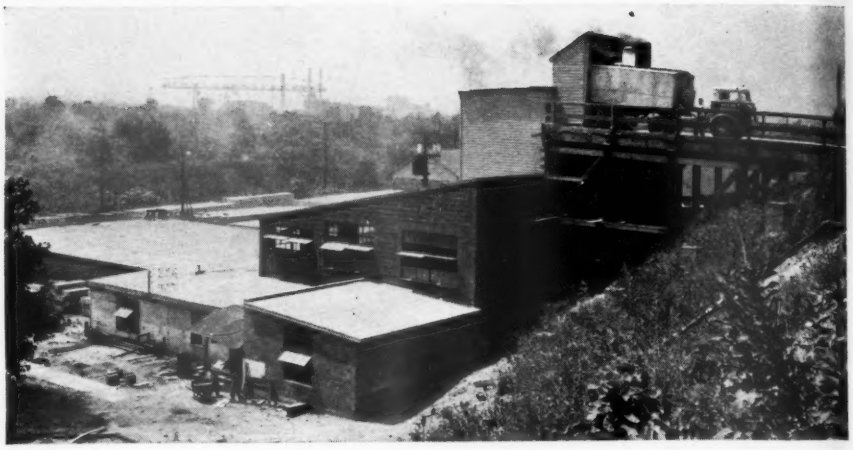
By C. E. EHLE
President, National Concrete Masonry Association
Vice President and Superintendent, The Cleveland Builders Supply Co., Cleveland, Ohio

another P&Q exclusive

SAND, light - weight slag and cement are dumped from trucks into hoppers at the top of the Hugo concrete products plant of Cleveland Builders Supply, Cleveland, Ohio, and come out of the steam kilns 24 hours later as cured concrete blocks without a single worker having touched the materials. This fully-automatic plant, one of the country's most modern, has attracted visitors from China, Russia, the Philippines, South America and other parts of the world.

The ways in which compressed air is applied in this steady production flow are especially noteworthy, since less than 20 per cent. of the country's 1,200 or more concrete products plants are using this versatile power to the full extent that is possible and profitable. At the beginning of the process, up in the cement bin, four air outlets keep the cement fluffed so that it will flow freely when released for mixing. There are no delays that way, no extra worked continuously pounding the clogged cement to keep it moving.

[1]This plant was fully described in the September, 1942, issue of PIT AND QUARRY. It has since been enlarged and improved.

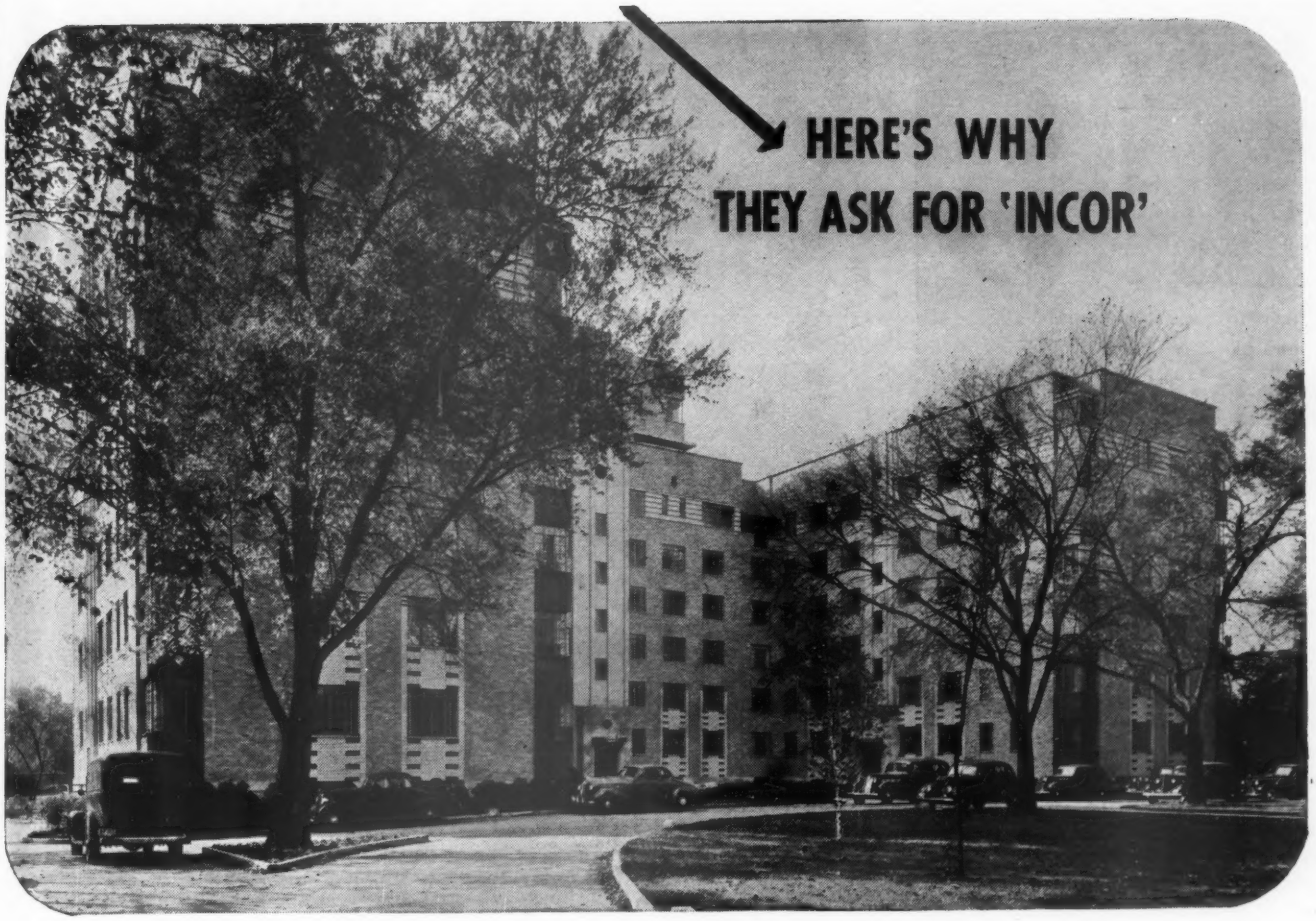


Cleveland Builders Supply Company plant, showing truck discharging bulk cement at right. Curing rooms at left.

The measured materials continue their downward flow to the mixers and from there are poured to the vibrating machines on the ground level of the plant. Coming out of these automatic machines are the compactly formed blocks, soft as eggs and ready to fall apart with the slightest jolt. This condition makes the use of hoists operated with cable and chain impractical, as the action in starting and stopping might jar the fresh blocks. Although light in weight after curing, the blocks weigh 35 pounds each at this point of production and it was a man-killing job to lift them by hand from the vibrator and rack at the rate of six a minute, 50 tons a day, until the plant installed air hoists especially designed for the work.

Air controls are in the worker's hands as he slides the hoists' blade under the fresh block. The action of

Below, left: Compressed-air-operated, piston-type hoists insure jolt-proof handling of blocks. Right: Sand, slag and cement are dumped into hoppers at top of the Hugo plant and are untouched by human hands until they reach the yard as cured blocks.



SIX WEEKS' EARLIER OCCUPANCY AT LESS COST WITH 'INCOR'

CONCRETE USERS ask for 'Incor', America's FIRST high early strength Portland cement, for a very tangible reason . . . to get top construction speed at less cost. On Royal York Apartments, Columbus, Ohio, 'Incor' saved one complete form-set and two sets of shoring. Erection time was advanced by six weeks, worth $10,500 in rentals to the owner. And 'Incor' saved the contractor $900 net, when this job was built, in 1937. At TODAY'S peak lumber and labor costs, this 'Incor' saving would amount to at least $2070!

Savings like these make it plain why leading Ready Mix Operators stock 'Incor'* 24-Hour Cement at all times, as part of their good service.

*Reg. U. S. Pat. Off.

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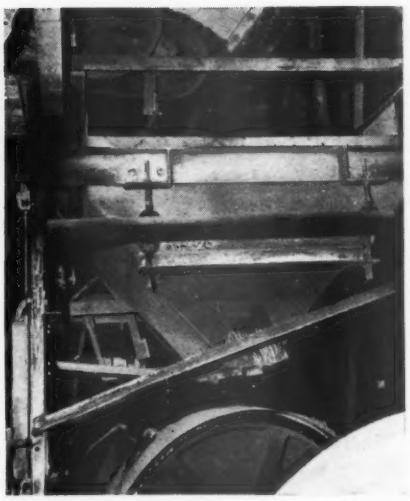
LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25,300,000 BARRELS ANNUAL CAPACITY



Above, left: Close-up of hoist lifting blocks from machine. Center: Cement flows freely from bin above into hopper for proportioning materials because 4 compressed-air outlets have kept the cement fluffed. Right: A worker cleaning concrete from machinery with compressed air.

the air piston is extremely fast in raising and lowering, yet the action also is so smooth that there is not the slightest jar in handling the blocks. Production increased 25 per cent. after the air hoists were installed, one at each of the four vibrating machines. Important as this substantial economy is, during the war's critical manpower shortage we gave more thanks to the air hoists for making the block racking job attractive enough to hold the workers. Weary backs, hand abrasions and sometimes oil dermatitis went with the job before the hoists were installed. Workers would not choose that when less laborious jobs were waiting to be filled. Our wartime production rate would have been impossible without this air-operated equipment.

Compressed air for the hoists and for fluffing cement is supplied by an air compressor driven by a 15-hp. motor and operated only as needed. A 30-hp. motor drives another air compressor which supplies the 10 air-operated sand rammers used in making concrete blocks in special shapes, such as sills, and for cast stone work. Jackhammers and chipping hammers used in maintenance work also are operated on compressed air from the compressor. Since the low-pressure boilers do not supply sufficient pressure for cleaning boiler tubes, the plant turns to its compressed air for this work.

Preventing concrete from forming on the floors, around the machinery and in the machinery is a never-ending job in a concrete products plant. The Hugo plant gets a thorough cleaning twice-a-day. Compressed air is used in this work because it is much faster than sweeping and far more thorough. Care in daily cleaning greatly reduces the work of removing hardened concrete with pneumatic chipping hammers.

What modern methods mean in production may be seen in the record. With a working force of 30 men the Hugo plant is turning out 265 tons of concrete blocks in an 8-hour day. The annual output has a wall displacement equivalent to that of 60,000,000 bricks. Cleveland's building industry, catching up on peacetime construction, is getting that output without a hitch and using the block for many types of jobs where brick and tile were used before and again is using concrete blocks for their insulation and acoustical qualities.

Modern Illinois Block Plant (*from page* 187)

tank, mounted on a near-by wall, supplies the mixing water, although no gauge is used for measuring. The sacks of cement are stored on this floor about 10 to 15 feet from the mixer. The bins, batcher, and mixer are supported by a structural-steel framework which is independent of the supports for the upper portion of the building.

Lift truck and rack for transporting blocks to curing rooms and storage yard.

A Besser Vibrapac block machine is located on the main or ground-level floor. It has a capacity of about 4,500 standard blocks per day, although the plant layout, designed by the Besser Manufacturing Company, provides for the addition of 2 more block machines and their bins, batcher, and mixer. A Besser pneumatic offbearer, mounted at the left of the block machine, is used to place the blocks on welded-steel racks made by the Johnson Iron Works. A De Vilbiss compressor, Model 330, furnishes the air for operating the offbearer.

An Erickson power lift truck is used to store the loaded racks in the curing rooms and to take the cured blocks out to the storage yard.

The five curing rooms, which have a total capacity of 7,000 blocks, make up one side of the lower portion of the building. Steam is used to bring the curing-room temperature up to about 105 degrees F. at which heat the blocks are cured for about 14 hours. Steam for the curing rooms and for heating the aggregates in the bins is supplied by a Lookout low-pressure, 15-horsepower, vertical boiler which is fired by a Chattanooga Stokal stoker. This steam plant is only temporary, however, as it is anticipated that an adjacent factory will supply the necessary power in the future. A Barrett-Cravens jack-lift truck is used for incidental jobs such as moving the empty racks.

With the molds on hand, this plant can turn out practically every standard block in sizes from 4 inches up. Both sand and gravel and Haydite are used as aggregates in this plant. In the days of abundant supplies, the production ratios ran about 80 per cent. Haydite and 20 per cent. sand and gravel; under present conditions, they are just the reverse. In addition to heating the aggregate in the bins for cold weather operation, it is necessary at times to add calcium chloride to the batch during extremely cold weather.

Double YOUR PRODUCTION

GRAVELEY BETTER-BUILT MACHINERY

AT LEAST 3,200 BLOCKS

EVERY EIGHT HOURS AT LOWER COST

Builders' demands for stepped-up production are promptly met with a BETTER BUILT double-unit concrete block machine. Precision production, at low cost, brings top quality, uniform blocks with an absolute minimum in maintenance and operators' attention.

The double unit machine has the same sturdy, rugged construction that marks every BETTER BUILT product.

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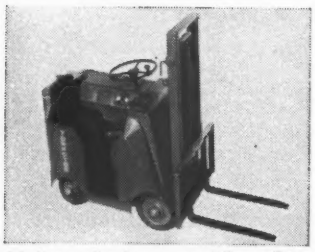
BOB GRAVELEY INDUSTRIES, INC., ORLANDO, FLORIDA

GRAVELEY BETTER-BUILT MACHINERY

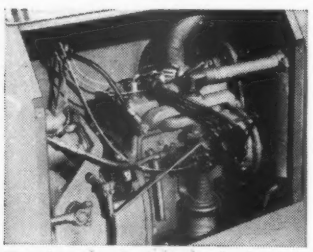
Announcing . . .

The New TOWMOTOR *LT-35 LIFT TRUCK*

Compact and lightweight--makes it economically sound for every industry, regardless of size, to enjoy the advantages of modern, mechanized materials handling.



Unique design provides plenty of clear, accessible space for the operator while retaining small overall dimensions and low center of gravity for maximum stability.



Engine and transmission in the LT-35 are easily accessible for inspection, adjustment and maintenance.

The new Towmotor LT-35 Lift Truck can lift, carry and stack 1500 to 2000 pound loads with ease, yet it is so compact and lightweight that it may, with utmost safety, be operated under full load on freight elevators of limited capacity, on upper floor levels where low load limits are imposed, or directly into motor trucks.

Because of its size and ability to operate in confined areas, the LT-35 makes it economically sound to provide mechanical handling on jobs where manual handling, with its excessive labor costs, was formerly the only available method. The small, agile LT-35 can save time, money and manpower on your operation by taking over countless handling tasks, accomplishing them in less time, with far less effort and at lower cost.

The new LT-35 is the smallest of the complete line of Towmotor Lift Trucks and Tractors, each a product of the experience and "know-how" that Towmotor has gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, 1228 East 152nd Street, Cleveland 10, Ohio.

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TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

NEW MACHINERY and SUPPLIES

● Vibrating Block Machine

Roy Darden Industries, Inc. of Atlanta, Georgia, has announced a new vibrating concrete-block machine called the Rockercrete, which is being manufactured for it by the Link-Belt Company's Atlanta plant. This machine is said to have a rugged frame and employs replaceable cores and liners. A mold box for making the new modular size blocks is available. The machine makes use of a leveling head, has a cushioned stroke and an eccentric type of vibrator. The absence of unwieldy levers and the ease of operator control keep the amount of physical exertion needed to the minimum.

New-type block machine.

● Tamping and Stripping Units

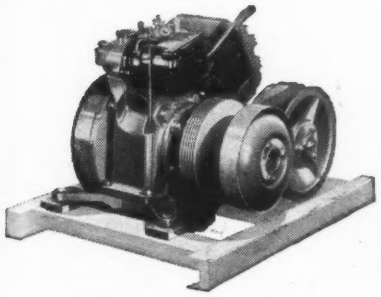
A tamping unit, known as the model "Triple B" Kent Tamper, is now offered to concrete products producers by the Kent Machine Co. of Cuyahoga Falls, O. This all-welded unit, claimed to be efficient and economical in its operation, may be used for all sizes of blocks by changing the size of the tamp feet. It can be placed over any standard block machine, either stripper or downface. Simplified design and sturdy construction are said to keep costs to the minimum. imum.

The Kent "Stripper" is also available to block producers and is intended for use with the Triple B to provide a complete block machine. This stripping unit is a combination of cam and crank mechanism, designed to give slow movement for starting the block from the tamped position. The speed is increased until the block is nearly out of the mold when the motion is retarded to bring the block to its high position without jar or shock.

• Power Unit

Salsbury Motors, Inc., of Los Angeles, Calif., has put on the market its "Power Package," a completely automatic power unit in which drive ratios are controlled by the driven unit and clutch engagement is controlled by engine speed.

The engine is the Salsbury Model 600.



Engine for power unit.

It is a single-cylinder, four-cycle, air-cooled type, developing 6.5 horsepower at 3,200 r.p.m. and weighing 56 pounds. "Straight Shot" carburetion is accomplished by employing a horizontal carburetor with a short, straight intake manifold mounted on an inclined cylinder.

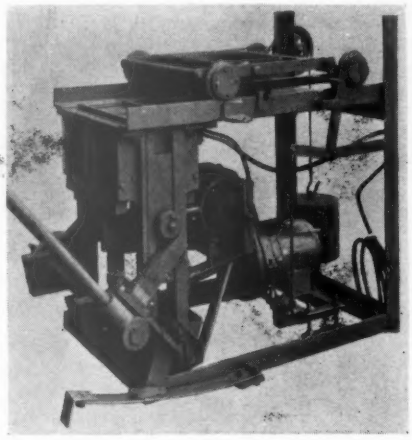
The Salsbury Automatic Transmission powered by this engine consists of a variable diameter drive pulley, a variable diameter driven pulley, and a V-belt. These units form a co-ordinated assembly which gives automatic, infinitely variable ratios over a 4 to 1 range. It is reportedly a true torque converter. Drive ratio is controlled as a function of driven shaft speed. Normal over-all reductions may range from 4:1 to 1:1 for light-duty, high-speed units, and from 200:1 to 50:1 for heavy-duty, low-speed requirements. Automatic change of ratio within these limits may be adjusted to suit the needs of the individual user. The transmission may be originally assembled to limit the engine speed automatically to any desired value under normal operating conditions. The V-belt used for this drive may be expected to have a normal life of 1,000 to 3,000 hours.

Built into the drive pulley of the Power Package is the Salsbury Clutch, an automatic, centrifugally-operated, opposed shoe type. The Power Package is readily adaptable for use on block making machines and concrete mixers.

• Oscillating Block Machine

The "Kissam-Blatt Controlled Oscillator Block Machine," designed and engineered by Allen Kissam of the Kissam Builder's Supply Company, Orlando, Fla., is now available to concrete block producers. Several of these machines have been giving satisfactory service for 10 years in the Kissam plants in Orlando. The controlled oscillation of the core only is said to permit the use of very wet mixes without slumping, and the pallets can be stripped off in less time than when drier mixes are used.

The manufacturer reports that 27 standard 2-cell blocks, passing the 800-pound strength test in 3 days, can be made from 1 sack of cement. Other features claimed for this controlled oscillation block machine include quiet operation, a hopper carriage which supports the full weight of the carriage and automatically starts and stops the core oscillation, precision machined construction, and a "drip-back" which helps keep the operation clean and salvages cement which might otherwise be lost. The oscillating mechanism is enclosed in a dust-



Controlled oscillator block maker.

and water-proof case and is said to require no attention during the life of the machine, except for occasional oil changes.

• Masonry Blade

A new abrasive masonry cutting blade has been placed on the market by the Champion Manufacturing Company, of St. Louis, Mo. A distinctive, identify-

Jade-colored blade.

ing feature of this blade, known as "Jade Blade," is the exclusive jade color. This blade was designed to overcome high cutting costs, short blade life, and cutting inefficiency. It is also said to eliminate operator eye-strain by its jade color. Sizes of 12 and 14 inches are available for any type of masonry saw. The blades are equipped with blotters for safety in operation and steel centers for efficient operation and protection of the shaft.

THE SALSBURY TURRETEER

RELIEVES 3 TO 5 MEN

- One Turreteer will do work of 4 to 6 men—quickly pays for itself.
- One truck will handle output of two blockmaking machines.
- The Turreteer is unusually fast (up to 8 m.p.h.), maneuverable, rugged, stable.
- Power plant and drive wheel are a single unit. Turret revolves to change direction.
- Articulation smoothes out the bumps.
- Four wheels under load at all times.
- Capacity: 4000 lb. load plus driver. Will negotiate steep ramps.

Write for Bulletin TTB-1

SALSBURY MOTORS, INC.
1201 LEXINGTON, POMONA, CALIFORNIA
A subsidiary of Northrop Aircraft, Inc.

PLANNING A CONCRETE BLOCK PLANT ?

Beauty and Utility Tailored to Location with ENGINEERED DESIGN *Results in* PROFIT

BUTLER BIN CO.
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CONCRETE BLOCK *Manufacturers*

IMMEDIATE DELIVERY on the New

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MIXER!

Rugged construction! Twin spiral mixing blades! High quality steel cut gears! AVAILABLE FROM STOCK RIGHT NOW! (Motor not included. Most 5 to 7 HP engines will operate.) Designed for use with or without conveyor to block machines.

REGULATED DISCHARGE

Slow or Fast, smooth flow of concrete—No segregation—Convenient discharge door control!

VISIBLE MIXING

See its thorough mixing action while in operation!

FAST MIXING

Fast end-to-end action of the aggregates by job-engineered twin spiral blades!
12 to 24 Cu. Ft. Capacities. Also made in capacities to Fit Your Requirements!

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We are interested in descriptive literature and price list for Jay-bee Mixers.

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STATE: _____

• Mechanical Piler

Loading, unloading, stacking, and elevating sacks, boxes, cases, and cartons are capabilities claimed by Standard Conveyors of North St. Paul, Minnesota, for their new product the "Handipiler." The small base frame is said to permit operations in confined areas, and models are available for stacking up to 15 feet. All casters are ball-bearing and swivelled, with roller-bearing wheels. The machine is locked in position by means of floor locks while being used. The upper end of the Handipiler may be adjusted to any position within its range either from the floor or on the pile. The carrying apron is reversible for conveying in either direction.

Heavy damage to buildings and equipment resulted from a fire which swept the Alpena Cement Products Company's plant at Alpena, Mich., on May 21. Production is being carried on in temporary quarters.

Adjustable piler aids in stockpiling packaged material.

ERIE *Standard* 2-LINE REHANDLER

THIS compact Lever Arm Rehandler Bucket of normal proportions has ample closing power to fill to capacity in compact materials, and is so designed that the reeving can be adjusted to obtain maximum speed with capacity grabs in loose materials. We have reduced the "height open dimension" thus requiring minimum headroom, enabling you to pile higher and to discharge into higher hoppers. Lighter weight alloy construction provides more pay load (scoop contents) less bucket dead weight. To see this bucket in all detail write for bulletin 403.

• *Write for Booklet 403*

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Erie Steel Construction Co., 667 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

"IT JUST KEEPS ROLLIN' ALONG"

KENT
CONTINUOUS MIXER

KENT Two Hopper No. 2½ Mixer. Capacity, 8 cubic yards per hour.

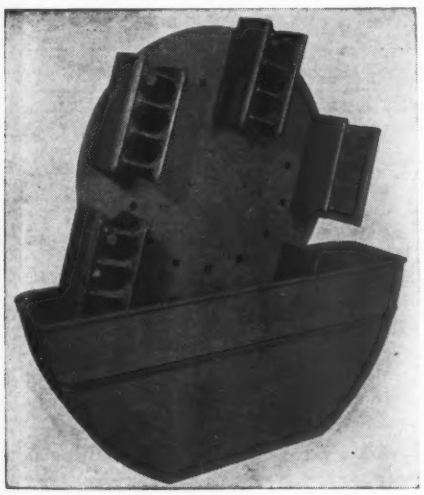
A STEADY STREAM OF PERFECTLY PROCESSED CONCRETE — insured by this KENT machine—is just what your block plant needs to establish output and profit records.

KENT accuracy in measuring cement and aggregates — KENT thoroughness of mixing — KENT simplicity and durability — KENT operating economy—enable concrete block producers everywhere to handle current orders and "get set" for bigger post-war business.

For Clean Pallets . . .

dip 'em in the

KENT DUNKER



Your pallets will mold better blocks and give longer service if they are regularly cleaned and oiled in a KENT Dunker. Hang 'em on the pins—as you take them off, the rest are rotated through the tank. Truck crank case oil works perfectly.

Write for Bulletin

The KENT MACHINE CO.
Cuyahoga Falls, Ohio

TRADE NOTES

G. E. Gates

Worthington Pump and Machinery Corp., Harrison, N. J., announces the appointment of George E. Gates, for 15 years prominent in Western construction equipment industry, as a staff member of the Worthington - Ransome Construction Equipment Division, with headquarters at San Francisco, Calif.

Brikcrete Associates, manufacturers of machinery for making colored, air-spaced Brikcrete blocks, have announced plans for expanding their plant in Grand Rapids, Mich. A part of the additional space acquired will be used for exhibiting samples of Brikcrete units made in the machines.

A new line has been added to the F. & C. Machine & Construction Company's products at Issaquah, Mich., where concrete block machines soon will be built.

In charge of the newly-opened Chicago branch office of the Besser Manufacturing Co. is Myron Hultmark. The office, located in the Civic Opera Building, will serve the Chicago area.

Vincent K. Cates, design and construction engineer, has been appointed to the staff of the Thompson & Lichtner Co., Inc., of Boston. Mr. Cates was recently released from the Navy, having served as commander, U.S.N.R., in command of the 122nd Construction Battalion in the Philippines.

TRADE LITERATURE

FLAM CONCRETE VIBRATING BLOCK TILE AND BRICK EQUIPMENT. (Also price list.) 8 pages. Stephen Flam, Van Nuys, Calif.

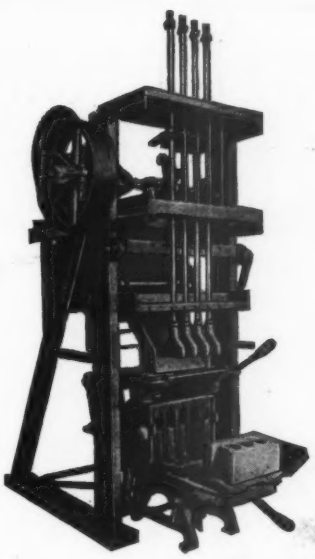
PRESENTING THE TRUCK MIXER OF TOMORROW. 15 pages. Bulletin No. 467. The Chain Belt Co., Milwaukee, Wis.

GEORGE SUPER VIBRATOR CONCRETE BLOCK MACHINE. F. C. George Machine Co., Orlando, Fla.

THE NEW REX MIXERS. 20 pages. Catalog No. 480. Chain Belt Co., Milwaukee, Wis.

TRIP-L-SEAL FOR BETTER CONCRETE. (Reprinted from Sweet's catalog—1946.) Trip-L-Seal, Inc., Washington 1, D. C.

AIR-ENTRAINED CONCRETE DUMPCRETE. 4 pages. Maxon Construction Company, Inc., Dayton, O.



Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Stearns Clipper Stripper Machines; Stearns Joltcrete Machines; Stearns Mixers; Cast Iron and Press Steel pallets. Straublox oscillating Attachments, etc. Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
1191 Fairview Ave. Columbus, Ohio

COMMERCIAL

CORED *Steel* PALLETS

More cored steel pallets used in 1941 than ever before. Block makers increased and bought the best equipment possible, knowing that cored steel pallets were without the faults of other types.

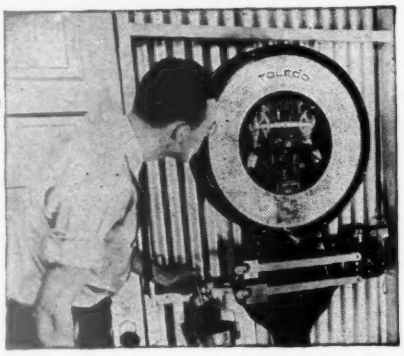
The Cold Pressed, Heavy Gauge Commercial Pallet is the equipment that lasts, easiest to handle, and free from breakage.

Our Pallet Catalog and Booklet "Here's the Dope" should be in all block makers' hands. Write for them.

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

TWO [SC]² EQUIPPED PLANTS DESCRIBED IN THIS ISSUE

[SC]² CONTROL uses precision, scientific equipment for the production of concrete in ordinary batching plants, for ready-mix concrete, construction and road projects and concrete products.



The [SC]² Moisture Meter. The only unit capable of determining moisture content in one minute.

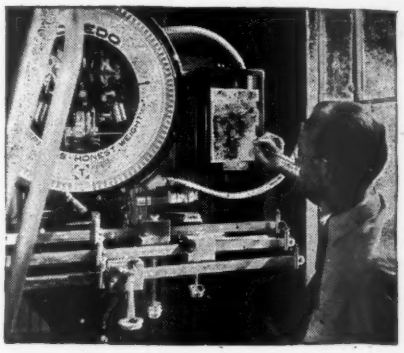
[SC]² CONTROL Provides:

MOISTURE DETERMINATIONS, accurate to ¼% made in one minute; one for every batch when necessary.

AUTOMATIC COMPENSATION FOR MOISTURE CONTENT in fine and coarse aggregates. Does not require calculations, charts or tables. With it, any intelligent weighman can produce remarkable uniformity.

PRECISION PROPORTIONING OF ALL INGREDIENTS using TOLEDO, the world's most accurate scales. Automatic cut-off is used for cement and water and is optional for aggregates.

AUTOMATIC GRAPHIC OR PRINTED RECORDS OF EVERY BATCH showing the delivered weight of each ingredient. Insures delivery of specified quantities.



The [SC]² Compensator Batching Scale which compensates for the moisture content of aggregates and graphically records every weighing operation.

In DRY-BATCHING operations the correct DRY weight of wet aggregates, and cement, is delivered and the exact amount of water to be added at the mixer is shown on each batch ticket.

[SC]² CONTROL is approved by every concrete engineer, ready-mix plant operator and contractor who has ever used it. Write TODAY for our folder on batching plant performance and get full information on what [SC]² CONTROL can accomplish in your plant. If you manufacture concrete we can help you.

Scientific Concrete Service Corporation

724 Salem Avenue, Elizabeth 3, N. J.

FOR SALE

2 No. 9 Stearns Jolcrete Block Machines complete with the following attachments:

1—3″ Attachment approx. 6,000 Presteel pallets.
1—4″ Attachment approx. 10,000 Presteel pallets.
1—6″ Attachment approx. 8,000 Presteel pallets.
2—8″ Attachment approx. 20,000 Presteel pallets.
1—10″ Attachment approx. 3,000 Presteel pallets.
1—12″ Attachment approx. 6,000 Presteel pallets.
1—8″ Header Attachment.
1—8″ Corner Attachment.
1—8″ Half Block Attachment.
1—Extra drive motor.
1—Extra Vibrating motor.
2—28′ Stearns mixer with motors V-Belt drive.

Machinery can be seen in operation at our plant. The above to be sold as one unit only and will be available on or before August 1st of this year.

HARRISBURG BUILDING UNITS COMPANY
1500 N. Cameron St. Harrisburg, Pa.

CINDER CRUSHERS

10 to 20 tons per hour capacity $345
25 to 50 tons per hour capacity 795
Vibrating screens 495

Guaranteed

Immediate delivery—Write, phone, or wire. Phones Garfield 5712. UN2832. Evenings.

BONDED SCALE COMPANY
1100 Bellview Columbus 7, Ohio

WANTED

Used small vibrating block machines, all makes. Also Besser Multi Mold and Champion Drain Tile machines. 8″x4″ pallets.

HAMPTON SERVICE
K. R. Ham Route 1, Box 273
East Moline, Illinois

WANTED TO PURCHASE

Used Stearns Joltcrete Concrete Block Machine or Besser Vibrapac Machine.

Box 67, c/o Pit & Quarry Publications
538 South Clark Street, Chicago 5, Ill.

FOR SALE

One Multiplex hand operated, lever type Concrete Block Machine, with 200 pallets. Makes 4″x8″x16″ blocks.

One Concrete Products Batching plant consisting of 20 ton two compartment bin with gates, ½ yd. batch hopper with scales, and bag cement hopper with discharge valve. Can furnish Bucket Elevator if wanted.

BOX 52
ST. LOUIS MISSOURI

ESTIMATE ANY CONSTRUCTION JOB *RIGHT* WITHOUT FIGURING

SCHAEFER'S NEW 1946 ESTIMATING TABLES contain 225 pages of tables, charts and illustrations covering all types of brick, tile, cinder block, stucco, concrete, cement, plaster and lumber construction. They cut estimating time to a fraction, prevent costly mistakes, soon save their cost many times over. Durable loose-leaf binder. Send for descriptive folder *today!*

SCHAEFER'S ESTIMATING TABLES
229 RAVENWOOD AVE., ROCHESTER 11, N.Y.

WANTED

10 S Jaeger Tilt Type Mixers.

AMERICAN WILBERT VAULT CORPORATION
Forest Park Illinois

FOR SALE

New vibrating type concrete block machines, mixers, hoppers and conveyors. Capacity, 1500 blocks per 8 hr. day. 30 day delivery. Reasonably priced.

R. J. MOSHER
Room 1053 228 N. La Salle St.
DEArborn 5055 Chicago, Ill.

FOR SALE

Stearns Junior Stripper. Stearns double Bar Tamper and strike-off in A-1 condition.
Write or call.

FLINT BLOCK CO.
G6203 N. Dort Highway Flint, Mich.

FOR SALE

Concrete Products Plant manufacturing concrete pipe, drain pipe, building blocks and roofing tile. Write for full information.

J. R. MONTIGEL
Route 5 Box 715
Riverside, California

POSITION WANTED

By Concrete Products man. With 12 years in concrete pipe and building block fields. High School and 2 years mechanical school education. Best of references, now employed.

Box No. 51
c/o Pit and Quarry Publications
538 So. Clark St. Chicago 5, Ill.